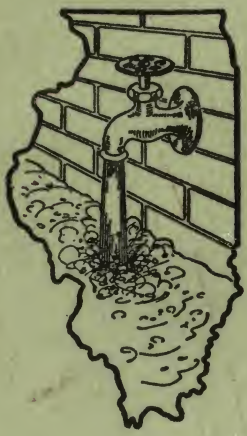
STATE OF ILLINOIS

[redacted]

ILLINOIS STATE PLUMBING CODE



DEPARTMENT OF PUBLIC HEALTH

[redacted]

July 1959

STATE OF ILLINOIS

WILLIAM G. STRATTON, Governor

ILLINOIS STATE PLUMBING CODE

ILLINOIS DEPARTMENT OF PUBLIC HEALTH

DIVISION OF SANITARY ENGINEERING

Adopted as an Advisory Code of Minimum Standards

of Good Plumbing Practice

July 1, 1959

(Printed by Authority of the State of Illinois)

FOREWORD

The Illinois State Plumbing Code has been prepared by the Illinois Department of Public Health with the advice of the Illinois Plumbing Advisory Board, under the authority contained in the Illinois Plumbing Code Law approved June 18, 1957. A large part of the Code has been extracted from the American Standard National Plumbing Code (ASA 40.8-1955) with the permission of the publisher, the American Society of Mechanical Engineers, 29 West 39th Street, New York 18, New York. This privilege is hereby gratefully acknowledged.

As authorized in the Plumbing Code Law, the Code sets forth minimum standards of good plumbing practice and shall be advisory to local governmental units in the State of Illinois in the adoption of plumbing regulations or codes by such governments. This Code may be adopted by local governmental units by reference under the authority of Section 5 of the Plumbing Code Law. Sufficient copies of the Code are available to governmental units so adopting the Code for distribution and reasonable general use.

(99318—6-59)

14

ACKNOWLEDGMENTS

ILLINOIS PLUMBING ADVISORY BOARD

HONORABLE WALTER S. MCAVOY, *Advisory Board Chairman*
House of Representatives

HONORABLE W. RUSSELL ARRINGTON, *Advisory Board Vice Chairman,* Senate

PROFESSOR RICHARD S. ENGELBRECHT, *Advisory Board Secretary*
University of Illinois

MR. JOHN K. DORSEY
Illinois Association of Plumbing Contractors

MR. HARRY R. SHAW
Illinois Pipe Trades Association

MR. A. L. SARGENT
Public Representative

MR. EDWIN GUMM
Agricultural Representative

CONTENTS

ILLINOIS PLUMBING CODE LAW

An Act in relation to the establishment of a minimum code of standards for the fixtures, materials, design and installation methods of plumbing systems, and making an appropriation in connection therewith. Approved June 18, 1957.

Be it enacted by the People of the State of Illinois, represented in the General Assembly:

Section 1. This Act shall be known and may be cited as the Illinois Plumbing Code Law.

Section 2. It has been established by scientific evidence that faulty plumbing can adversely affect the public health, and that improper plumbing has in the past caused widespread disease and epidemics with disastrous consequences. The public health can be affected adversely through the introduction of disease organisms into a water supply system as a result of back-siphonage or cross-connections, or through the escape of vermin from drainage systems. The public health can also be affected by the escape of noxious or asphyxiating gasses as a result of the faulty design or installation of traps or the faulty design or installation of vents in the waste disposal system.

The presently existing control of fixtures, materials, design and installation methods of plumbing systems is through a variety of ordinances of local governmental units which have been enacted from time to time, and which contain widely variable standards for plumbing control. Many of these ordinances are unnecessarily rigid for some items and are deficient in other respects concerning matters vitally essential for the protection of water supplies and public health.

Consistent with its duty to safeguard the health of the people of this State, the General Assembly therefore declares that a guide for minimum control, by local governmental units, of plumbing materials and fixtures, the design of plumbing systems, and the construction and installation methods of plumbing systems is essential for the protection of public health. Therefore, in order to authoritatively establish what shall be considered good plumbing practice, this Act provides for the promulgation of a minimum code of standards by the Department which shall be advisory to local governmental units in this State in the adoption of plumbing regulations by such governments.

regulating plumbing and the fixtures, materials, design and installation methods of plumbing systems; and it may prepare educational bulletins on plumbing and plumbing systems for the benefit of home owners, plumbing inspectors, plumbers, plumbing contractors and other interested persons.

Section 8. There is created the Illinois Plumbing Advisory Board which shall consult with and advise the Department on matters of policy in connection with the promulgation of the minimum code of standards required by this Act. The Governor shall appoint one representative from each of the following groups as members of the Board: associations of plumbing contractors, associations or unions of journeyman plumbers, agricultural associations, and the general public. The Speaker of the House of Representatives shall appoint one member of the House, and the President of the Senate shall appoint one member of the Senate as members of the Board. The senior professor of sanitary engineering in the Department of Civil Engineering in the College of Engineering of the University of Illinois shall also be a member of the Board. The appointive members of the Board shall serve during the pleasure of the appointing power. Members of the Board shall receive no compensation but may be reimbursed for expenses necessarily incurred in performing their duties under this Act.

Section 9. The sum of $40,000 or so much thereof as may be necessary is appropriated to the Department of Public Health for the purpose of administering this Act.

STATE OF ILLINOIS
} ss.
COUNTY OF SANGAMON

I, Roland R. Cross, M.D., Director of the Department of Public Health, State of Illinois, do hereby certify that the following Plumbing Code has been promulgated in accordance with the "Illinois Plumbing Code Law", approved June 18, 1957, and shall be in full force and effect upon filing of same with the Secretary of State, State of Illinois.

In WITNESS WHEREOF, I have hereunto set my hand and caused the Seal of the Department of Public Health to be affixed this 1st day of July 1959.

Roland R. Cross M.D.

Director of Public Health

BASIC PRINCIPLES

The basic principles of this Code are enunciated as basic goals in environmental sanitation worthy of accomplishment through properly designed, acceptably installed, and adequately maintained plumbing systems. Some of the details of plumbing construction must vary, but the basic sanitary and safety principles are the same. The results desired and necessary to protect the health of the people are the same everywhere. As unforeseen situations arise which are not covered in the body of the Code, these principles shall serve to define the intent.

Principle No. 1—All premises intended for human habitation, occupancy, or use shall be provided with a supply of pure and wholesome water, neither connected with unsafe water supplies nor subject to the hazards of backflow or back siphonage.

Principle No. 2—Plumbing fixtures, devices, and appurtenances shall be supplied with water in sufficient volume and at pressures adequate to enable them to function satisfactorily and without undue noise under all normal conditions of use.

Principle No. 3—Plumbing shall be designed and adjusted to use the minimum quantity of water consistent with proper performance and cleaning.

Principle No. 4—Devices for heating and storing water shall be so designed and installed as to prevent dangers from explosion through overheating.

Principle No. 5—Every building having plumbing fixtures installed and intended for human habitation, occupancy, or use on premises abutting on a street, alley, or easement in which there is a public sewer shall have a connection with the sewer.

Principle No. 6—Each family dwelling unit on premises abutting on a sewer or with a private sewage-disposal system shall have, at least, one water closet, one kitchen-type sink, and a bathtub or shower installed to meet the basic requirements of sanitation and personal hygiene.

All other structures for human occupancy or use on premises abutting on a sewer or with a private sewage-disposal system shall have adequate sanitary facilities but in no case less than

one water closet and one handwashing lavatory or other similar fixture for cleansing purposes.

Principle No. 7—Plumbing fixtures shall be made of smooth nonabsorbent material, shall be free from concealed fouling surfaces, and shall be located in ventilated enclosures.

Principle No. 8—The drainage system shall be designed, constructed, and maintained so as to guard against fouling, deposit of solids, and clogging, and with adequate cleanouts so arranged that the pipes may be readily cleaned.

Principle No. 9—The piping of the plumbing system shall be of durable material, free from defective workmanship and so designed and constructed as to give satisfactory service for its reasonable expected life.

Principle No. 10—Each connection, direct or indirect, to the drainage system shall be equipped with a water-seal trap.

Principle No. 11—The drainage system shall be designed to provide an adequate circulation of air in all pipes with no danger of siphonage, aspiration, or forcing of trap seals under conditions of ordinary use.

Principle No. 12—Each vent terminal shall extend to the outer air and be so installed as to minimize the possibilities of clogging and the return of foul air to the building, or adjoining buildings.

Principle No. 13—The plumbing system shall be subjected to such tests as will effectively disclose all leaks and defects in the work.

Principle No. 14—No substance which will clog the pipes, produce explosive mixtures, destroy the pipes or their joints, or interfere unduly with the sewage-disposal process shall be allowed to enter the building drainage system.

Principle No. 15—Proper protection shall be provided to prevent contamination of food, water, sterile goods, and similar materials by backflow of sewage. When necessary, the fixture, device, or appliance shall be connected indirectly with the building drainage system.

Principle No. 16—No water closet or urinal shall be located in a room or compartment which is not properly lighted and ventilated.

Principle No. 17—If water closets or other plumbing fixtures are installed in buildings where there is no sewer within a reasonable distance, suitable provision shall be made for disposing of the building sewage by some accepted method of sewage treatment and disposal.

Principle No. 18—Where a plumbing system may be subject to backflow of sewage, suitable provision shall be made to prevent its overflow in the building.

Principle No. 19—Plumbing systems shall be maintained in a sanitary and serviceable condition. See definition "Plumbing."

Principle No. 20—All plumbing fixtures shall be so installed with regard to spacing as to be reasonably accessible for their intended use.

Principle No. 21—Plumbing shall be installed with due regard to preservation of the strength of structural members and prevention of damage to walls and other surfaces through fixture usage.

Principle No. 22—Sewage or other waste from a plumbing system which may be deleterious to surface or sub-surface waters shall not be discharged into the ground or into any waterway unless it has first been rendered innocuous through subjection to some suitable form of treatment.

CHAPTER 1

DEFINITIONS

1.1 GENERAL

1.1.1 For the purpose of this Code, the following terms shall have the meaning indicated in this chapter.

1.1.2 No attempt is made to define ordinary words which are used in accordance with their established dictionary meaning except where the word has been loosely used and it is necessary to define its meaning as used in this Code to avoid misunderstanding.

1.1.3 Because the primary purpose is to define terms rather than words, the definitions are arranged alphabetically according to the first word of the term rather than the noun.

1.2 DEFINITION OF TERMS

Administrative Authority. The Administrative Authority is the individual official, board, department, or agency established and authorized by county, city, or other political subdivision created by law to administer and enforce the provisions of the plumbing code as adopted or amended.

Air Gap. An air gap in a water-supply system is the unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe, faucet, or appurtenance supplying water to a tank, plumbing fixture, or other device and the flood-level rim of the receptacle.

Anchors. See *Supports.*

Anti-Siphon Ball Cock. An anti-siphon ball cock is a device consisting essentially of a float valve equipped with a flow-splitter to provide for tank and trap refill, which has an integral vacuum breaker, and which is used in conjunction with flush tanks.

Approved. Approved means accepted or acceptable under an applicable specification stated or cited in this code, or accepted as suitable for the proposed use under procedures and powers of the Administrative Authority.

Area Drain. An area drain is a receptacle designed to collect surface or rain water from an open area.

Backflow. Backflow is the flow of water or other liquids, mixtures, or substances into the distributing pipes of a potable supply of water from any source or sources other than its intended source. (See back siphonage.)

Backflow Connection. A backflow connection or condition is any arrangement whereby backflow can occur.

Backflow Preventer. A backflow preventer is a device or means to prevent backflow into the potable water system.

Back Pressure. Back pressure is an exerted pressure which causes or tends to cause liquid or air to flow in the direction opposite to the normal direction of flow in a closed conduit.

Back Siphonage. Back siphonage is the flowing back of used, contaminated, or polluted water from a plumbing fixture or vessel into a water-supply pipe due to a negative pressure in such pipe. (See backflow.)

Ball Cock. A device consisting essentially of a float valve equipped with a flow-splitter to provide for tank and trap refill, used in conjunction with flush tanks.

Battery of Fixtures. A "battery of fixtures" is any group of two or more similar adjacent fixtures which discharge into a common horizontal waste or soil branch.

Boiler Blow-Off. A boiler blow-off is a controlled outlet on a boiler to permit emptying or discharge of sediment.

Branch. A branch is any part of the piping system other than a main, riser, or stack.

Branch, Fixture. See *Fixture Branch.*

Branch, Horizontal. See *Horizontal Branch.*

Branch Interval. A branch interval is a length of soil or waste stack corresponding in general to a story height, but in no case less than 8 feet within which the horizontal branches from one floor or story of a building are connected to the stack.

Branch Vent. A branch vent is a vent connecting one or more individual vents with a vent stack or stack vent.

Building. A building is a structure, built, erected, and framed of component structural parts designed for the housing, work, recreation, shelter, enclosure, or support of persons, animals, or property of any kind.

Building Classification. Building classification is the arrangement adopted by the Administrative Authority for the designation of buildings in classes based upon their use or occupancy.

Building Drain. The building drain is that part of the lowest piping of a drainage system which receives the discharge from soil, waste, and other drainage pipes inside the walls of the building and conveys it to the public sewer or septic tank.

Building Storm Drain. A building storm drain is a drain used for conveying rain water, surface water, ground water, sub-surface water, condensate, cooling water, or other similar discharge to a storm sewer or a combined sewer, or other approved point of discharge.

Building Subdrain. A building subdrain is that portion of a drainage system which cannot drain by gravity into the building sewer.

Building Trap. A building trap is a device, fitting, or assembly of fittings installed in the building drain to prevent circulation of air between the drainage system of the building and the building sewer.

Circuit Vent. A circuit vent is a branch vent that serves two or more traps and extends from in front of the last fixture connection of a horizontal branch to the vent stack or stack vent.

Code. The word "Code" when used alone shall mean these regulations, subsequent amendments thereto, or any emergency rule or regulation which the Administrative Authority having jurisdiction may lawfully adopt.

Combination Fixture. A combination fixture is a fixture combining one sink and tray or a two- or three-compartment sink or tray in one unit.

Combined Building Drain. A combined building drain receives storm water and sewage.

Combination Waste and Vent System. A combination waste and vent system is a specially designed system of waste piping

embodying the horizontal wet venting of one or more sinks or floor drains by means of a common waste and vent pipe adequately sized to provide free movement of air above the flow line of the drain.

Common Vent. A common vent is a vent connecting at the junction of two fixture drains and serving as a vent for both fixtures.

Common Waste. A common waste is a drain from a fixture containing multiple compartments connected to a single trap.

Conductor. See *Leader.*

Continuous Vent. A continuous vent is the continuation of a vertical soil or wastepipe from a fixture trap along the same center line.

Cross-Connection. A cross-connection is any physical connection or arrangement between two otherwise separate piping systems, one of which contains potable water and the other water of unknown or questionable safety, whereby water may flow from one system to the other, the direction of flow depending on the pressure differential between the two systems. (See *Backflow and Back Siphonage*).

Dead End. A dead end is a branch leading from a soil, waste, or vent pipe, building drain, or building sewer, which is terminated at a developed distance of 2 feet or more by means of a plug or other closed fitting.

Developed Length. The developed length of a pipe is its length along the center line of the pipe and fittings.

Diameter. Unless specifically stated, the term "diameter" is the nominal diameter as designated commercially.

Downspout. See *Leader.*

Drain. A drain is any pipe which carries waste water or waterborne wastes in a building drainage system.

Drainage System. A drainage system (drainage piping) includes all the piping within public or private premises, which conveys sewage, rain water, or other liquid wastes to a legal point of disposal, but does not include the mains of a public sewer system or private or public sewage-treatment or disposal plant.

Dual Vent. See *Common Vent.*

Durham System. Durham system is a term used to describe soil or waste systems where all piping is of threaded pipe, using recessed drainage fittings.

Effective Opening. The effective opening is the minimum cross-sectional area at the point of water-supply discharge, measured or expressed in terms of (1) diameter of a circle, (2) if the opening is not circular, the diameter of a circle of equivalent cross-sectional area. (This is applicable to air gap.)

Existing Work. Existing work is a plumbing system or any part thereof which has been installed prior to the effective date of this Code, or under authorization of a previously issued permit in accordance with this Code.

Fixture Branch. A fixture branch is a water-supply pipe serving more than one fixture.

Fixture Drain. A fixture drain is the outlet pipe from the trap of a fixture to the junction of that drain with any other drain pipe.

Fixture Supply. A fixture supply is a water-supply pipe connecting the fixture with the fixture branch.

Fixture Unit. A fixture unit is a quantity in terms of which the load-producing effects on the plumbing system of different kinds of plumbing fixtures are expressed on some arbitrarily chosen scale.

Fixture-Unit Flow Rate. Fixture-unit flow rate is the total discharge flow in gpm of a single fixture divided by 7.5 which provides the flow rate of that particular plumbing fixture as a unit of flow. Fixtures are rated as multiples of this unit of flow.

Float Valve. A float valve is a positive operating valve, operated by a float, used to control the water level in a vessel, tank, or other container.

Flood Level. The flood level is that elevation at which impounded fluid will overflow.

Flood-Level Rim. The flood-level rim is the top edge of the receptacle from which water overflows.

Flooded. A fixture is flooded when the liquid therein rises to the flood-level rim.

Flush Valves. A flush valve is a device located at the bottom of the tank for the purpose of flushing water closets and other fixtures.

Flushometer Valve. A flushometer valve is a device which discharges a predetermined quantity of water to fixtures for flushing purposes.

Frostproof Closet. A frostproof closet is a hopper that has no water in the bowl and has the trap and the control valve for its water supply installed below the frost line.

Grade. Grade is the slope or fall in reference to a horizontal plane. In drainage it is usually expressed as the fall in a fraction of an inch per foot length of pipe.

Grease Interceptor. See *Interceptor.*

Grease Trap. See *Interceptor.*

Group of Fixtures. A group of fixtures means two or more fixtures adjacent or near each other. See paragraph 10.12.4.

Hangers. See *Supports.*

Horizontal Branch. A horizontal branch is a drain pipe extending laterally from a soil or waste stack or building drain, with or without vertical sections or branches, which receives the discharge from one or more fixture drains and conducts it to the soil or waste stack or to the building drain.

Horizontal Pipe. Horizontal pipe means any pipe or fitting which makes an angle of less than 45 deg. with the horizontal.

Hose. A hose is any flexible pipe which is readily removable without the use of tools, which may or may not be equipped with fittings.

House Drain. See *Building Drain.*

House Trap. See *Building Trap.*

Indirect Waste. An indirect waste is a pipe that does not connect directly with the drainage system but conveys liquid wastes by discharging through an air gap into a plumbing fixture or receptacle which is directly connected to the drainage system.

Individual Vent. An individual vent is a pipe installed to vent fixture trap and which connects with the vent system above the fixture served or terminates in the open air.

Industrial Wastes. Industrial waste is any liquid, gaseous, solid or other waste substance or a combination thereof resulting from

any process of industry, manufacturing trade or business or from the development, processing or recovery of any natural resources.

Insanitary. Contrary to sanitary principles—injurious to health

Interceptor. An interceptor is a device designed and installed so as to separate and retain deleterious, hazardous, or undesirable matter from normal wastes and permit normal sewage or liquid wastes to discharge into the disposal terminal by gravity.

Invert. The invert is the floor, bottom, or lowest part of the internal cross-section of a pipe or conduit.

Leaching Well or Pit. See Individual Sewage-Disposal System in Appendix B.

Leader. A leader (downspout) is the water conductor from the roof to the building storm drain, combined building drain, or other means of disposal.

Length of Pipe. See *Developed Length.*

Liquid Waste. Liquid waste is the discharge from any fixture, appliance, or appurtenance, in connection with a plumbing system which does not receive fecal matter.

Load Factor. Load factor is the percentage of the total connected fixture unit flow rate which is likely to occur at any point in the drainage system. It varies with the type of occupancy, the total flow unit above this point being considered, and with the probability factor of simultaneous use.

Loop Vent. A loop vent is an individual vent that loops back and terminates in its own drain. See paragraph 12.15.6.

Main. The main of any system of continuous piping is the principal artery of the system, to which branches may be connected.

Main Sewer. See *Public Sewer.*

Main Vent. The main vent is the principal artery of the vent system, to which vent branches may be connected.

May. The word "may" is a permissive term.

Manhole. A manhole is an opening constructed in a sewer or any portion of a plumbing system to eliminate restriction of flow at changes of direction or junctions and facilitate cleaning, of sufficient size to permit a person to gain access thereto.

New Work. Any plumbing system, part thereof, or addition to or alteration of an existing system, being installed or recently completed within the area of jurisdiction of the Administrative Authority.

Nuisance. The word "nuisance" embraces public nuisance as known at common law or in equity jurisprudence; and whatever is dangerous to human life or detrimental to health; whatever building, structure, or premises is not sufficiently ventilated, sewered, drained, cleaned, or lighted, in reference to its intended or actual use; and whatever renders the air or human food or drink or water supply unwholesome, are also severally, in contemplation of this Code, nuisances.

Offset. An offset in a line of piping is a combination of elbows or bends which brings one section of the pipe out of line but into a line parallel with the other section.

Person. Person is a natural person, his heirs, executors, administrators or assigns; and includes a firm, partnership or corporation, its or their successors or assigns. Singular includes plural; male includes female.

Pipe. A pipe is any closed conduit used to convey fluids, air, or gases, not otherwise defined in this Code.

Pitch. See *Grade.*

Plumbing. Plumbing is the practice, materials, and fixtures used in the installation, maintenance, extension, and alteration of all piping, fixtures, appliances, and appurtenances in connection with any of the following: Sanitary drainage or storm drainage facilities, the venting system and the public or private water-supply systems, within or adjacent to any building, structure, or conveyance; also the practice and materials used in the installation, maintenance, extension, or alteration of storm-water, liquid waste, or sewerage, and water-supply systems of any premises to their connection with any point of public disposal or other acceptable terminal. Plumbing does not mean or include, and nothing in this Code shall be held or construed to have any application to the trade of drilling water wells, which constitute the sources of private water supplies, or the trade or business of installing water softening equipment and apparatus and of maintaining and servicing the same, or the business of manufacturing or selling plumbing fixtures, appliances, equipment or hardware; nor does it mean or include minor repairs which do not require

changes in the piping to or from plumbing fixtures or involve the removal, replacement, installation or reinstallation of any pipe or plumbing fixtures, where used for personal or domestic use.

Plumbing Fixtures. Plumbing fixtures are installed receptacles, devices, or appliances which are supplied with water or which receive or discharge liquids or liquid-borne wastes, with or without discharge into the drainage system with which they may be directly or indirectly connected, and installed for personal or domestic use and purposes.

Plumbing Inspector. See *Administrative Authority.*

Plumbing System. The plumbing system includes the water-supply and distribution pipes; plumbing fixtures and traps; soil, waste, and vent pipes; building drains and building sewers including their respective connections, devices, and appurtenances within the property lines of the premises, and water-treating or water using equipment, and installed for personal or domestic use and purposes.

Pool. A pool is a water receptacle used for swimming or as a plunge or other bath, designed to accommodate more than one bather at a time.

Potable Water. Potable water is water which is satisfactory for drinking, culinary, and domestic purposes, and meets the requirements of the Illinois State Department of Health.

Private or Private Use. In the classification of plumbing fixtures, private applies to fixtures in residences and apartments and to fixtures in private bathrooms of hotels and similar installations where the fixtures are intended for the use of a family or an individual.

Private Sewer. A private sewer is a sewer privately owned and not directly controlled by public authority.

Public or Public Use. In the classification of plumbing fixtures, public applies to fixtures in general toilet rooms of schools, gymnasiums, hotels, railroad stations, public buildings, bars, public comfort stations, and other installations (whether pay or free) where a number of fixtures are installed so that their use is similarly unrestricted.

Public Official. See *Administrative Authority.*

Public Sewer. A public sewer is a common sewer directly controlled by public authority.

Public Water Supply. A public water supply is any facility for furnishing water for drinking or general domestic use through a system of distribution mains in incorporated municipalities; or unincorporated communities where 10 or more separate lots or properties are served.

Relief Vent. A relief vent is a pipe having the primary function of providing for circulation of air between drainage and vent systems.

Return Offset. A return offset is a double offset installed so as to return the pipe to its original alignment.

Revent Pipe. A revent pipe is a vent pipe, the lower end of which connects with the stack below the lowest horizontal branch, the upper end connecting with the stack vent above the highest horizontal branch.

Rim. A rim is an unobstructed open edge of a fixture.

Riser. A riser is a water-supply pipe which extends vertically one full story or more to convey water to branches or fixtures.

Roof Drain. A roof drain is a receptacle installed to receive water collecting on the surface of a roof and to discharge it into the leader (downspout).

Roughing-In. Roughing-in is the installation of all parts of the plumbing system which can be completed prior to the installation of fixtures. This includes drainage, water-supply, and vent piping, and the necessary fixture supports.

Safe Pan. A safe pan is a pan or other collector placed beneath a pipe or fixture to prevent leakage from escaping onto the floor, ceilings or walls.

Sand Interceptor. See *Interceptor.*

Sanitary Sewer. A sanitary sewer is a pipe which carries sewage and excludes storm, surface, and ground-water.

Seal. See *Trap Seal.*

Second Hand. Second hand as applied to material or plumbing equipment is that which has been installed, and has been used, removed, and passed to another ownership or possession.

Separator. See *Interceptor.*

Septic Tank. A septic tank in a watertight receptacle which receives the discharge of a drainage system or part thereof, and is designed and constructed so as to separate solids from the liquid, digest organic matter through a period of detention, and allow the liquids to discharge into the soil outside of the tank through a system of open-joint or perforated piping, or disposal pit.

Service Pipe. The water-supply pipe from the water main or source of supply to the building served.

Sewage. Sewage is any liquid waste containing animal or vegetable matter in suspension or solution, and may include liquids containing chemicals in solution.

Sewerage System. A sewerage system comprises all piping, appurtenances and treatment facilities used for the collection and disposal of sewage, except plumbing inside, and in connection with buildings served and the building drain.

Shall. The word "shall" is a mandatory term.

Side Vent. A side vent is a vent connecting to the drain pipe through a fitting at an angle not greater than 45 deg. to the vertical.

Size of Pipe and Tubing. See *Diameter.*

Slip Joint. A slip joint is a conection in which one pipe slides into another. The joint is made tight with an approved gasket and threaded retainer.

Slope. See *Grade.*

Soil Pipe. A soil pipe is any pipe which conveys the discharge of water closets or fixtures having similar functions, with or without the discharge from other fixtures, to the building drain or building sewer.

Soil Vent. See *Stack Vent.*

Special Waste Pipe. See Chapter 9.

Stack. A stack is the vertical main of a system of soil, waste, or vent piping.

Stack Group. Stack group is a term applied to the location of fixtures in relation to the stack so that by means of proper fitting, vents may be reduced to a minimum.

Stack Vent. A stack vent (sometimes called a waste vent or soil vent) is the extension of a soil or waste stack above the highest horizontal drain connected to the stack.

Stack Venting. Stack venting is a method of venting a fixture or fixtures through the soil or waste stack.

Storm Drain. See *Building Storm Drain.*

Subsoil Drain. A subsoil drain is a drain which receives only subsurface or seepage water and conveys it to a place of disposal.

Sump. A sump is a tank or pit which receives sewage or liquid waste, located below the normal grade of the gravity system and which must be emptied by mechanical means.

Supports. Supports, hangers, and anchors are devices for supporting and securing pipe and fixtures to walls, ceilings, floors, or structural members.

Trap. A trap is a fitting or device so designed and constructed as to provide, when properly vented, a liquid seal which will prevent the back passage of air without materially affecting the flow of sewage or waste water through it.

Trap Seal. The trap seal is the maximum vertical depth of liquid that a trap will retain, measured between the crown weir and the top of the dip of the trap.

Vacuum Breaker. A vacuum breaker is a device designed to prevent backsiphonage by providing an opening through which air may be drawn to relieve negative pressure (vacuum) in the water supply pipe.

Vent Pipe. See *Vent System.*

Vent Stack. A vent stack is a vertical vent pipe installed primarily for the purpose of providing circulation of air to and from any part of the drainage system and terminating to the atmosphere or in the stack vent.

Vent System. A vent system is a pipe or pipes installed to provide a flow of air to or from a drainage system or to provide a circulation of air within such system to protect trap seals from siphonage and back pressure.

Vertical Pipe. A vertical pipe is any pipe or fitting which is installed in a vertical position or which makes an angle of less than 45 deg. with the vertical.

Waste. See *Liquid Waste* and *Industrial Wastes.*

Waste Pipe. A waste pipe is a pipe which conveys only liquid waste, free of fecal matter.

Water-Distributing Pipe. A water-distributing pipe in a building or premises is a pipe which conveys water from the water-service pipe to the plumbing fixtures and other water outlets.

Water Main. The water (street) main is a water-supply pipe for public or community use.

Water Outlet. A water outlet, as used in connection with the water-distributing system, is the discharge opening for the water (1) to a fixture; (2) to atmospheric pressure (except into an open tank which is part of the water-supply system); (3) to a boiler or heating system; (4) to any water-operated device or equipment requiring water to operate, but not a part of the plumbing system

Water Riser Pipe. See *Riser.*

Water-Service Pipe. See *Service Pipe.*

Water-Supply System. The water-supply system of a building or premises consists of the water-service pipe, the water-distributing pipes, and the necessary connecting pipes, fittings, control valves, and all appurtenances in or adjacent to the building or premises.

Wet Vent. A wet vent is a vent pipe, or drain pipe which serves as a vent, which receives the discharge of wastes from one or more fixtures at a higher elevation.

Yoke Vent. A yoke vent is a pipe connecting upward from a soil or waste stack to a vent stack for the purpose of preventing pressure changes in the stacks.

CHAPTER 2

GENERAL REGULATIONS

2.1 CONFORMANCE WITH CODE

2.1.1 All plumbing systems hereafter installed shall conform at least with the provisions of this Code. See Chapter 14 for Administration.

2.2 GRADE OF HORIZONTAL DRAINAGE PIPING

2.2.1 Horizontal drainage piping shall be run in practical alignment at a uniform grade. See Chapter 11 for specific slopes.

2.3 CHANGE IN DIRECTION

2.3.1 Fittings. Changes in direction in drainage piping shall be made by the appropriate use of 45-degree wyes, long-or short-sweep quarter bends, sixth, eighth, or sixteenth bends, or by a combination of these or equivalent fittings. Single and double sanitary tees and quarter bends may be used in drainage lines only where the direction of flow is from the horizontal to the vertical.

2.3.2 Short Sweeps. Short sweeps not less than 3 inches in diameter may be used in soil and waste lines where the change in direction of flow is from either the horizontal to the vertical or from the vertical to the horizontal, and may be used for making necessary offsets between the ceiling and the next floor above.

2.4 FITTINGS AND CONNECTIONS

2.4.1 Fittings Prohibited. No fitting having a hub in the direction opposite to flow, or tee branch shall be used as a drainage fitting. No running threads, bands, or saddles shall be used in the drainage system. No drainage or vent piping shall be drilled or tapped.

2.4.2 Heel or Side-Inlet Bend. A heel or side-inlet quarter bend shall not be used as a vent when the inlet is placed in a horizontal position.

2.4.3 **Obstruction to Flow.** No fitting, connection, device, or method of installation which obstructs or retards the flow of water, wastes, sewage, or air in the drainage or venting systems in an amount greater than the normal frictional resistance to flow, shall be used unless it is indicated as acceptable in this Code or is approved by the Administrative Authority as having a desirable and acceptable function and is of ultimate benefit to the proper and continuing functioning of the plumbing system. The enlargement of a 3-inch closet bend or stub to 4 inches shall not be considered an obstruction. None of the methods described in Pars. 2.27.1, 2.27.2, and 2.27.3 shall be considered as restriction to flow.

2.5 REPAIR AND ALTERATIONS

2.5.1 **Existing Buildings.** In existing buildings or premises in which plumbing installations are to be altered, repaired, or renovated, necessary deviations from the provision of this Code may be permitted, provided such deviations conform to the intent of the Code and are approved in writing by the Administrative Authority.

2.5.2 **Health or Safety.** Wherever compliance with all the provisions of this Code fails to eliminate or alleviate a nuisance which may involve health or safety hazards, the owner or his agent shall install such additional plumbing or drainage equipment as may be necessary to abate such nuisance.

2.6 SEWER AND WATER PIPES

2.6.1. Water service pipes, or any underground water pipes, shall not be run or laid in the same trench as the building sewer or drainage piping, except as provided for in Paragraphs 10.6.1 and 10.6.2.

2.7 TRENCHING, EXCAVATION, AND BACKFILL

2.7.1 **Support of Piping.** Buried piping shall be supported throughout its entire length.

2.7.2 **Tunneling and Driving.** Tunneling may be done in yards, courts, or driveways of any building site. When pipes are driven, the drive pipe shall be at least one size larger than the pipe to be laid.

2.7.3 **Open Trenches.** All excavations required to be made for the installation of a building-drainage system, or any part thereof within the walls of a building, shall be open trench work and shall be kept open until the piping has been inspected, tested, and accepted.

2.7.4 **Mechanical Excavation.** Mechanical means of excavation may be used.

2.7.5 **Backfilling.** Adequate precaution shall be taken to insure proper compactness of backfill around piping without damage to such piping. Trenches shall be backfilled and compacted in thin layers to 12 in. above the top of the piping with clean earth which shall not contain stones, boulders, cinder-fill, or other materials which would damage or break the piping or cause corrosive action. Mechanical devices such as bulldozers, graders, etc., may then be used to complete backfill to grade. Fill shall be properly compacted.

2.8 STRUCTURAL SAFETY

2.8.1 In the process of installing or repairing any part of a plumbing and drainage installation, the finished floors, walls, ceilings, tile work, or any other part of the building or premises which must be changed or replaced shall be left in a safe structural condition in accordance with the Requirements of the Building Code or as approved by the Administrative Authority.

2.9 WORKMANSHIP

2.9.1 Workmanship shall conform to generally accepted good practice.

2.10 PROTECTION OF PIPES

2.10.1 **Breakage and Corrosion.** Pipes passing under or through walls shall be protected from breakage. Pipes passing through or under cinder or concrete or other corrosive material shall be protected against external corrosion by protective coating, wrapping, or other means which will prevent such corrosion.

2.10.2 **Cutting or Notching.** No structural member shall be weakened or impaired by cutting, notching, or otherwise, except to the extent permitted by the proper Administrative Authority.

2.10.3 **Pipes Through Footings or Foundation Walls.** A soil or waste pipe, or building drain passing under a footing or through a foundation wall shall be provided with a relieving arch; or there shall be built into the masonry wall an iron pipe sleeve two pipe sizes greater than the pipe passing through or as may be approved in writing by the Administrative Authority.

2.10.4 **Freezing.** No water, soil, or waste pipe shall be installed or permitted outside of a building or in an exterior wall unless adequate provision is made to protect such pipe from freezing where necessary.

2.11 DAMAGE TO DRAINAGE SYSTEM OR PUBLIC SEWER

2.11.1 It shall be unlawful for any person to deposit by any means into the building drainage system or into a public or private sewer any ashes; cinders; rags; flammable, poisonous, or explosive liquids; gases; oils; grease or any other material which would or could obstruct, damage, or overload such system or sewer, or interfere unduly with the sewage disposal process.

2.12 INDUSTRIAL WASTES

2.12.1 Wastes detrimental to the public sewer system or detrimental to the functioning of the sewage-treatment plant shall be treated and disposed of as directed by the Administrative Authority or other authority having jurisdiction.

2.13 SLEEVES

2.13.1 Annular space between sleeves and pipes shall be filled or tightly calked with coal tar or asphaltum compound, lead, or other material found equally effective and approved as such by the Administrative Authority.

2.14 RATPROOFING

2.14.1 **Exterior Openings.** All exterior openings provided for the passage of piping shall be properly sealed with snugly fitting collars of metal or other approved ratproof material securely fastened into place.

2.14.2 **Interior Openings.** Interior openings through walls, floors, and ceilings shall be ratproofed as found necessary by the Administrative Authority.

2.15 USED OR SECOND-HAND EQUIPMENT

2.15.1 It shall be unlawful to purchase, sell, or install used equipment or material for plumbing installation unless it complies with the minimum standards set forth in this Code.

2.16 CONDEMNED EQUIPMENT

2.16.1 Any plumbing equipment condemned by the Administrative Authority because of wear, damage, defects, or sanitary hazards, shall not be reused for plumbing purposes.

2.17 DEPTH OF BUILDING DRAINS AND WATER SERVICE (OUTSIDE OF BUILDING)

2.17.1 **Building drains not protected from freezing,** shall be installed below the recorded frost penetration, at or below the minimum depth prescribed by the authority having jurisdiction.

2.17.2 **Water service piping** shall be installed below the recorded frost penetration, at or below the minimum depth prescribed by the authority having jurisdiction.

2.18 PIPING IN RELATION TO FOOTINGS

2.18.1 Parallel. No piping shall be laid parallel to building footings closer than 3 feet, except with the approval of the Administrative Authority when space is not available. When parallel piping is laid deeper than the building footings the horizontal distance from the footing shall be equal to, or greater than the vertical distance below the footing, but in no case shall the horizontal distance be less than 3 feet, except with the approval of the Administrative Authority when space is not available.

2.19 DRAINAGE BELOW SEWER LEVEL

2.19.1 Drainage piping located below the level of the sewer shall be installed as provided for in Chapters 10 and 11.

2.20 CONNECTIONS TO PLUMBING SYSTEM REQUIRED

2.20.1 All plumbing fixtures, drains, appurtenances, and appliances used to receive or discharge liquid wastes or sewage shall be connected properly to the drainage system of the building or premises, in accordance with the requirements of this Code.

2.21 SEWER REQUIRED

2.21.1 Every building having plumbing fixtures installed and intended for human habitation, occupancy, or use on premises abutting on a street, alley, or easement in which there is a public sewer, or which is otherwise so located as to have a sewer available, shall have a connection with the sewer.

2.22 INDIVIDUAL OR PRIVATE SEWAGE-DISPOSAL SYSTEM

2.22.1 If plumbing fixtures are installed in buildings located other than as specified in paragraph 2.21.1, suitable provisions shall be made for disposal of the building sewage in accordance with the provisions of Appendix B.

2.23 LOCATION OF FIXTURES

2.23.1 **Light and Ventilation.** Plumbing fixtures, except drinking fountains and single lavatories, shall be located in compartments or rooms provided with ventilation and illumination conforming to standards of good practice. (See ASA A53.1-1946 and paragraphs 7.7.7 and 7.8.8.)

2.23.2 **Improper Location.** Piping, fixtures, or equipment shall not be located in such a manner as to interfere with the normal operation of windows, doors, or other exit openings.

2.24 PIPING MEASUREMENTS

2.24.1 Except where otherwise specified in this Code all measurements between pipes or between pipes and walls, etc., shall be made to the center lines of the pipes.

2.25 VENTING

2.25.1 The drainage system shall be provided with a system of vent piping which will permit the admission or emission of air so that under no circumstance of normal or intended use shall the seal of any fixture trap be subjected to a pressure differential of more than 1 inch of water.

2.26 VENTILATION DUCTS

2.26.1 Ventilation ducts from washrooms and toilet rooms shall exhaust to the outer air or form an independent system.

2.27 WATER CLOSET CONNECTIONS

2.27.1 Lead. Three-inch lead bends and stubs may be used on water closets or similar connections, provided the inlet is dressed or swaged to receive a 4-inch floor flange.

2.27.2 Iron. Three-inch bends may be used on water closets or similar connections, provided a 4-inch x 3-inch flange is used to receive the fixture horn.

2.27.3 Reducing. Four-by-three-inch reducing bends are acceptable.

2.28 DEAD ENDS

2.28.1 In the installation or removal of any part of a drainage system, dead ends shall be avoided except where necessary to extend a cleanout so as to be accessible.

CHAPTER 3

MATERIALS—QUALITY AND WEIGHT

3.1. MATERIALS

3.1.1 Minimum Standards. The materials listed in this chapter shall conform at least to the standards cited when used in the construction, installation, alteration, or repair of any part of a plumbing and drainage system, except that the Administrative Authority shall allow the extension, addition, or relocation of existing soil, waste, or vent pipes with materials of like grade or quality, as permitted in paragraph 2.5.1.

3.1.2 Use of Materials. Each material listed in Table 3.8 shall conform to at least one of the standards cited opposite it. Its use shall be further governed by the requirement imposed in other chapters of the Code. Materials not included in the table shall be used only as provided for in paragraph 3.1.1. Materials shall be free of manufacturing defects or damage, however occasioned, which would, or would tend to, render such materials defective, unsanitary, or otherwise improper to accomplish the purpose of this Code.

3.1.3 Specifications for Materials. Standard specifications for materials for plumbing installations are listed in Table 3.8. Products conforming at least to any of the specifications listed for a given material shall be considered acceptable.

NOTE 1. Abbreviations used in Table 3.8 refer to standards or specifications identified as follows:

ASA—American Standards approved by the American Standards Association, 70 East 45th Street, New York 17, N.Y.

ASTM—Standards and Tentative Standards published by the American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa.

FS—Federal Specifications published by the Federal Specifications Board and obtained from the General Services Administration, Regional Office 3, Washington 25, D.C.

AWWA—Standards and Tentative Standards published by the American Water Works Association, 500 Fifth Avenue, New York 18, N.Y.

CS—Commercial Standards representing recorded voluntary recommendations of the trade, issued by the United States Department of Commerce and obtainable from the Superintendent of Documents, Government Printing Office, Washington 25, D.C.

MSS—Standards published by the Manufacturers Standardization Society of the Valve and Fittings Industry, 420 Lexington Avenue, New York 17, N.Y.

SPR—Simplified Practice Recommendations representing recorded recommendations of the trade and issued by the U.S. Department of Commerce, Washington 25, D.C.

NSF—Seal of Approval Listing published by the National Sanitation Foundation Testing Laboratory, Inc., Ann Arbor, Michigan.

NOTE 2. ASTM Standards are issued under fixed designations; the final number indicates the year of original adoption, or in the case of revision, the year of last revision. "T" indicates Tentative. In the "CS" series of standards, also, the final number indicates the year of issue. For Federal Specifications, the year indicated in Table 3.8 is that of the date of issue or that of the latest revision or amendment.

NOTE 3. All standards and specifications for materials are subject to change. Designations carrying indication of the year of issue may thus become obsolete. Table 3.8 gives the full designations of standards current at the time this Code is printed. As provided in paragraph 3.7.1, the Administrative Authority is required to review this table and have it brought up to date at intervals not exceeding two years.

3.1.4 **Identification of Materials.** Each length of pipe, and each pipe fitting, trap, fixture, and device used in a plumbing system shall have cast, stamped, or indelibly marked on it the maker's mark or name, the weight, type, and classes of the product, when such marketing is required by the approved standard that applies.

3.2 SPECIAL MATERIALS

3.2.1 Lead. See Table 3.8. Sheet lead shall be not less than the following:

For safe pans—not less than 4 pounds per square foot.
For flashings of vent terminals—not less than 3 pounds per square foot.
Lead bends and lead traps shall not be less than ⅛ inch wall thickness.

3.2.2 Copper. Sheet copper shall be not less than the following:

Safe pans—12 ounces per square foot.
Vent terminal flashings—8 ounces per square foot.

3.2.3 Calking Ferrules shall be manufactured from red brass and shall be in accordance with the following table:

Pipe Sizes Inches	Inside Diameter Inches	Length Inches	Minimum Weight Each
2	2¼	4½	1 lb. 0 oz.
3	3¼	4½	1 lb. 12 oz.
4	4¼	4½	2 lb. 8 oz.

3.2.4 Soldering Bushings shall be of red brass in accordance with the following table:

Pipe Sizes Inches	Minimum Weight Each
1¼	6 oz.
1½	8 oz.
2	14 oz.
2½	1 lb. 6 oz.
3	2 lb. 0 oz.
4	3 lb. 8 oz.

3.2.5 Floor Flanges. Floor flanges for water closets or similar fixtures shall be not less than ⅛ inch thick for brass—¼ inch thick and not less than 2-inch calking depth for cast iron or galvanized malleable iron. If of hard lead, they shall weigh not less than 1 lb. 9 oz. and be composed of lead alloy with not less than 7.75 per cent antimony by weight.

Flanges shall be soldered to lead bends, or shall be calked, soldered or screwed to other metal.

Closet screws and bolts shall be brass.

3.2.6 Cleanouts.

(a) Cleanout plugs shall be of brass and shall conform to Federal Specification WW-P-401.

(b) Plugs may have raised square or countersunk heads.

(c) Countersunk heads should be used where raised heads may cause a hazard.

3.3 PLASTIC PIPE AND FITTINGS FOR POTABLE WATER SUPPLIES.

3.3.1 **Plastic pipe and fittings** may be used in a potable water system only for the house or building service connection and in the cold water piping system outside the building walls or foundation. All plastic pipes so used shall be installed below the recorded frost penetration, at or below the minimum depth prescribed by the Administrative Authority. All risers to outside fittings or bibbs shall be of metal piping as authorized in paragraph 10.10.1. Plastic pipe or fittings shall not be used in the hot water piping system or in the cold water system within the building.

3.3.2 **Plastic pipe and fittings, plastic cement, and pipe thread lubricant** for rigid plastic pipe shall have received the Seal of Approval of the National Sanitation Foundation and the manufacturer, material, and trade name shall be included in the "Seal of Approval Listing of Plastic Materials, Pipe, and Fittings for Potable Water Supplies" compiled and published by The National Sanitation Foundation Testing Laboratory, Inc., Ann Arbor, Michigan. All such material at the job location must visibly bear the above-cited stamped Seal of Approval.

3.3.3 **All pastic pipe and fittings for use in potable water systems** shall have a maximum continuous working pressure of at least 100 psi at 73.4° F. The use of flexible plastic pipe is further limited to Series 3 Polyethylene pipe in sizes up to and including 2 inches nominal as specified in Commercial Standard CS 197-59, or currently applicable revision of that standard.

3.3.4 **Joints and Fittings.** Joints in plastic pipe shall be made in accordance with the manufacturers recommendations, subject to the following limitations:

(a) Flexible plastic pipe shall be installed only with insert and clamp type fittings. All clamps shall be of corrosion resistant material and homogenous throughout.

(b) Rigid or semi-rigid plastic pipe shall be installed only with solvent welded, flanged, or threaded type fittings and joints. Threaded joints may be used only with Schedule

80 and 120 I.P.S. pipe and fittings, with dimensions as shown in Table 1.

Table 1. Dimensions and tolerances for rigid or semi-rigid plastic pipe.

Nominal Size (Inches)	Outside Diameter[1] (Inches)		Wall Thickness[2] (Inches)		
			Schedule 40	Schedule 80	Schedule 120
1/8	0.405	±0.008	0.068	0.095	.....
1/4	.540	± .008	.088	.119	.....
3/8	.675	± .008	.091	.126	.....
1/2	.840	± .008	.109	.147	0.170
3/4	1.050	± .010	.113	.154	.170
1	1.315	± .010	.133	.179	.200
1 1/4	1.660	± .012	.140	.191	.215
1 1/2	1.900	± .012	.145	.200	.225
2	2.375	± .012	.154	.218	.250
2 1/2	2.875	± .015	.203	.276	.300
3	3.500	± .015	.216	.300	.350
3 1/2	4.000	± .020	.226	.318	.350
4	4.500	± .020	.237	.337	.438
5	5.563	± .030	.258	.375	.500
6	6.625	± .035	.280	.432	.562

[1] If pipe is out-of-round, no diameter shall be outside the tolerance shown.
[2] Minimum thickness. A tolerance of plus 10 percent is allowed on schedules 40, 80, and 120 pipe.

(c) All joints shall be tested as required in paragraph 14.12.1.

3.3.5 **Plastic Cement and Pipe Thread Compound.** Plastic cement and pipe thread compound for rigid plastic pipe shall have been tested and found to be satisfactory by the National Sanitation Foundation Testing Laboratory, Inc., and shall be specific for the piping material.

3.3.6 **Installation.**

(a) Plastic pipe shall not be installed in any tunnel or chase that is heated or which contains hot water, hot air or steam piping.

(b) The pipe trench shall have a smooth, compacted bottom of soil or sand. The first six inches of backfill shall be free of rock or debris and shall be placed by hand.

3.4 PLASTIC PIPE AND FITTINGS FOR DRAINAGE AND VENT PIPING ABOVE GROUND WITHIN THE BUILDING WALLS.

3.4.1 **Plastic pipe and fittings for drainage and vent piping** above ground within the building walls shall be Schedule 40, 80 or 120, Type I or Type II Rigid Polyvinyl Chloride Pipe in conformance with Commercial Standard CS 207-57, or currently applicable revision of that standard. Fittings shall be molded, fully recessed, socket type designed for solvent welded joints. The diameter of the socket, measured just inside the chamfered entrance shall be not more than 0.04 inches larger than the minimum outside diameter of the pipe. Special purpose threaded or flanged adapter fittings, couplings, unions, etc., may be used provided that they are fully recessed and create no restriction to flow greater than that created by conventional fittings. Junctions or couplings in plastic drainage and vent piping made by welding adjacent sections as a substitute for the use of standard drainage fittings are prohibited.

3.4.2 **Joints in plastic drainage or vent piping** above ground within the building walls shall be solvent welded, except that threaded or flanged joints may be used with adapter fittings as outlined in paragraph 3.4.1. The solvent cement shall be specific for polyvinyl chloride pipe. The finished joint shall meet the performance requirements specified in paragraph 11.2.1.

3.4.3 **Hangers and Supports.** Vertical piping shall be supported at not less than every story height and at its base. Horizontal piping shall be supported at not less than 6-foot intervals.

3.5 PLASTIC PIPE AND FITTINGS FOR DRAINAGE PIPING.

3.5.1 **Plastic pipe and fittings for drainage piping** shall have a minimum average crushing strength of 800 pounds per linear foot, at which loading the maximum reduction of the original inside diameter shall not exceed 15 percent. The crushing test shall be the 3-edge bearing test as outlined in ASTM C4-55. The fittings shall be manufactured of the same material as the pipe and shall be molded, threaded, flanged or socket type designed for solvent welded joints. The diameter of the socket, measured just inside the chamfered entrance shall be not more than 0.04 inches larger than the minimum outside diameter of the pipe.

Fittings shall be fully recessed and shall be smooth and non-restrictive to flow. Special purpose plastic adapter fittings may be used, if necessary provided that they create no restriction to flow and meet the performance requirements specified in paragraph 11.2.1. Junctions or couplings in plastic drainage piping made by welding adjacent sections as a substitute for the use of standard drainage fittings are prohibited.

3.5.2 **Above ground flexible sewer connections to house trailers** or mobile homes employing plastic or other elastomeric pipe and fittings shall be made in accordance with the requirements of the Illinois Trailer Coach Park Control Law.

3.5.3 **Joints in plastic drainage piping** shall be solvent welded, threaded, or flanged. The solvent cement shall be specific for the type of plastic material used in the manufacture of the pipe and fittings. In all other respects, the joints shall be made in accordance with the manufacturers recommendations, and shall meet the performance requirements specified in paragraph 11.2.1.

3.5.4 **Installation.** Plastic drainage piping shall be laid in a trench having a smooth compacted bottom of soil or sand. The first six inches of backfill shall be placed and compacted by hand. All plastic pipe so used shall be installed below the maximum recorded frost penetration, at or below the minimum depth prescribed by the Administrative Authority.

3.6 ALTERNATE MATERIALS AND METHODS

3.6.1 **Existing Premises.** In existing buildings or premises in which plumbing installations are to be altered, repaired, or renovated, the Administrative Authority has discretionary powers to permit deviation from the provisions of this Code, provided that such a proposal to deviate is first submitted for proper determination in order that health and safety requirements, as they pertain to plumbing, shall be observed.

3.6.2 **Approval.** Provisions of this Code are not intended to prevent the use of any material, device, method of assemblage or installation, fixture, or appurtenance not specifically authorized, provided such alternate has been approved by the Administrative Authority, in accordance with this section.

3.6.3 **Evidence of Compliance.** The Administrative Authority shall require sufficient evidence to enable him to judge wheth-

er proposed alternates meet the requirements of this Code for safety and health.

3.6.4 **Tests.** When there is insufficient evidence to substantiate claims for alternates, the Administrative Authority may require tests of compliance as proof to be made by an approved agency at the expense of the applicant.

3.6.5 **Test Procedure.** Tests shall be made in accordance with generally recognized standards; but in the absence of such standards, the Administrative Authority shall specify the test procedure.

3.6.6 **Repeated Tests.** The Administrative Authority may require tests to be repeated if, at any time, there is reason to believe that an alternate no longer conforms to the requirements on which its approval was based.

3.7 APPROVED MATERIALS

3.7.1 **Periodic Review.** The Administrative Authority shall periodically, at least once every two years, review the approved list of specifications and standards for materials in Table 3.8 and in Chapter 7 "Plumbing Fixtures" to check the designations, numbers, etc., which are used for identification, and if there are later issues shall submit them for their legal adoption.

NOTE: All standards and specifications for materials are subject to change. Designations carrying indication of the year of issue may thus become obsolete. Table 3.8 gives the full designations of standards current at the time this Code is printed.

3.7.2 **Specific Usage.** Each chapter of this Code indicates specifically the type of material permitted for the various parts of the plumbing system. The specifications for each of those materials are given in Table 3.8.

Table 3.8 MATERIALS FOR PLUMBING INSTALLATIONS

Materials	See Sections 3.1.3 and 3.7.2		Other Standards and Remarks
	ASA	ASTM	
NONMETALLIC PIPING			
Asbestos Cement Pressure Pipe	.....	C296-55	FS:SS-P-351a (1953)
Asbestos Cement Sewer Pipe	.....	.....	FS:SS-P-351a[1]
Bituminized Fiber Sewer Pipe and fittings	.....	.....	CS:116-54 FS:SS-P-356 (1955)
Clay Sewer Pipe, Standard Strength	A106.3-1958	C13-57T	
Clay Sewer Pipe, Extra Strength	.....	C200-57T	
Clay Sewer Pipe, Perforated	A106.1-1954	C211-57T	
Clay Sewer Pipe, Standard Strength, Ceramic Glazed	A106.4-1958	C261-54	
Concrete Sewer Pipe	.....	(C76-57T (C14-57	
Drain Tile	A6.1-1956	(C4-55 (C118-56	
Plastic Pipe and Fittings	.....	(CS197-59 (CS207-57	
FERROUS PIPE AND FITTINGS			
Cast Iron Soil Pipe and Fittings	A40.1-1935	A74-42	FS:WW-P-401 (1951)[2]
Cast Iron Soil Pipe (Threaded)	A40.5-1943		
Cast Iron Screwed Drainage Fittings	B16.12-1953		
Cast Iron Pressure Pipe (Water)	(A21.2-1953	.....	(AWWA:C102-53
	(A21.6-1953	.....	(AWWA:C106-53
	(A21.8-1953	.....	(AWWA:C108-53

Table 3.8 MATERIALS FOR PLUMBING INSTALLATIONS (Continued)

Materials	See Sections 3.1.3 and 3.7.2		Other Standards and Remarks
	ASA	ASTM	
FERROUS PIPE AND FITTINGS (Continued)			
Cast Iron Pressure Fittings	.....	.....	AWWA:C100-55
Cast Iron Pipe Flanges and Flanged Fittings	B16.1-1948		
Cast Iron Screwed Fittings (Water)	B16.4-1949		
Mechanical Joint for Cast Iron Pipe	A21.11-1953	.....	AWWA:C111-53
Galvanized Pipe and Fittings	B36.20-1958	A120-57T	
Malleable Iron Fittings	B16.3-1953		
Open Hearth Iron Pipe	B36.23-1956	A253-55T	
Steel Pipe	.....	A53-58at	AWWA C202-49
Steel Pipe Flanges and Fittings	B16.5-1957		
Stainless Steel Pipe	B36.19-1957		
Wrought Iron Pipe	(B36.2-1956 (B36.10-1950	A72-56T	
NON-FERROUS PIPE AND FITTINGS			
Brass Pipe	.....	B43-58[4]	
Brass Tubing	.....	B135-58[4]	
Copper Pipe	.....	B42-58[4]	
Seamless Copper Tubing	.....	B75-58[4]	
Copper Water Tube (KLM)	H23.1-1956	B88-58[4]	
Copper Drainage Tube (DWV)	.....	B306-58	
Brass or Bronze Flanges and Flanged Fittings	B16.24-1953		
Cast-Brass Solder-Joint Fittings	B16.18-1950		
Cast-Brass Solder-Joint Drainage Fittings	B16.23-1955		
Brass or Bronze Screwed Fittings	B16.15-1958		
Wrought Copper and Wrought Bronze Solder-Joint Fittings	B16.22-1951		

Table 3.8 MATERIALS FOR PLUMBING INSTALLATIONS (Continued)

Materials	See Sections 3.1.3 and 3.7.2		Other Standards and Remarks
	ASA	ASTM	
NON-FERROUS PIPE AND FITTINGS (Continued)			
Flared Fittings for Copper (Water) Tubes	B16.26-1958		
Lead Pipe and Traps	.....	.....	FS:WW-P-325 (1944)
MISCELLANEOUS			
Air Gap Standards	A40.4-1942		
Backflow Preventors	A40.6-1943		
Calking Materials (Water)	.....	.....	AWWA:C600-54T
Cement Lining for Cast Iron Pipe	A21.4-1953	.....	AWWA:C104-53
Coal Tar Enamel (Protective Coating)	.....	.....	AWWA:C203-57
Ferrous Plugs, Bushings and Locknuts With Pipe Threads	B16.4-1949		
Galvanized Iron and Steel Sheets	.....	A93-55T	
Fixture Setting Compound	.....	.....	FS:HH-C-536a (1954)
Precast Jointing Material for Clay Pipe	.....	.....	CS:181-52
Sheet Brass	.....	B36-56	
Sheet Copper	.....	(B152-55 (B248-55T	
Sheet Lead	.....	.....	FS:QQ-L-201a (1953)[3]
Soft Solder	.....	B32-58	
Valves	.....	A181-57T	(MSS: SP-37-1949 and SP-52-1957 (SPR: 183-46
Hot Water Heaters	(C72.1-1949 (Z21.10.1-1956 (Z21.10.2-1956	.....	Addenda 21.10.1a-1957 Included
Manhole Frames and Covers	A35.1-1947		

Table 3.8 MATERIALS FOR PLUMBING INSTALLATIONS (Concluded)

[1] Asbestos-cement sewer pipe shall meet Federal Specifications SS-P-351a dated October 7, 1953, except for the following substitutions:

Sizes only 4, 5 and 6-inch
Class—Nonpressure tests
Lengths: 10 feet—out of roundness, inside diameter; ± ¼ inch
Hydrostatic strength; Not applicable
Flexural strength—9 foot span
4-inch pipe— 560 lbs.
5-inch pipe— 900 lbs.
6-inch pipe—1290 lbs.
Crushing strength
4-inch pipe—1740 lbs.
5-inch pipe—1680 lbs.
6-inch pipe—1420 lbs.
Tests: one specimen from each 300 lengths of pipe

[2] Amendment 3 dated July 18, 1951, subject: Pipe and Pipe-Fittings, Soil, Cast-Iron.
[3] Amendment No. 1, dated September 18, 1953, included.
[4] Refer to ASTM Specification B251-58 for dimensions and dimensional tolerances.

CHAPTER 4

JOINTS AND CONNECTIONS

4.1 TIGHTNESS

4.1.1 Joints and connections in the plumbing system shall be gastight and watertight for the pressure required by test, with the exceptions of those portions of perforated or open-joint piping which are installed for the purpose of collecting and conveying ground or seepage water to the underground storm drains.

4.2 TYPES OF JOINTS

4.2.1 **Calked Joints.** Calked joints for cast iron bell-and-spigot pipe shall be firmly packed with oakum or hemp and filled with molten lead not less than 1 inch deep and not to extend more than ⅛ inch below rim of hub. No paint, varnish, or other coatings shall be permitted on the jointing material until after the joint has been tested and approved.

4.2.1.1 **Calked Joints—Water piping system.** Yarning material used in the water piping system shall conform to AWWA specification No. C600-54T. Material shall consist of asbestos fiber rope, paper rope, or rubber rings. Material shall be handled so as to prevent unnecessary contamination before and during use. The use of jute, hemp, or oakum is expressly forbidden.

4.2.2 **Threaded Joints—Screwed Joints.** Threaded joints shall conform to American National Taper Pipe Thread, ASA B2.1-1945. All burrs shall be removed. Pipe ends shall be reamed or filed out to size of bore, and all chips shall be removed. Pipe-joint cement and paint shall be used only on male threads. White lead compounds shall not be used for water supply piping.

4.2.3 **Wiped Joints.** Joints in lead pipe or fittings, or between lead pipe or fittings and brass or copper pipe, ferrules, solder nipples, or traps, shall be full-wiped joints. Wiped joints shall have an exposed surface on each side of a joint not less than ¾ inch and at least as thick as the material being jointed. Wall or floor flange lead-wiped joints shall be made by using a lead ring or flange placed behind the joints at wall or floor. Joints

between lead pipe and cast iron, steel or wrought iron shall be made by means of a calking ferrule, soldering nipple, or bushing.

4.2.4 **Soldered, or Sweat Joints.** Soldered or sweat joints for tubing and pipe shall be made with approved fittings. Surfaces to be soldered or sweated shall be cleaned bright. The joints shall be properly fluxed and made with approved solder. Joints in copper water tubing shall be made by the appropriate use of approved brass or wrought copper water fittings, properly sweated or soldered together.

4.2.5 **Flared Joints.** Flared joints for soft-copper water tubing shall be made with fittings meeting approved standards. The tubing shall be expanded with a proper flaring tool.

4.2.6 **Hot-Poured Joints.** Hot-poured compound for clay or concrete sewer pipe shall not be water absorbent and when poured against a dry surface shall have a bond of not less than 100 psi. All surfaces of the joint shall be cleaned and dried before pouring. If wet surfaces are unavoidable, a suitable primer shall be applied. Compound shall not soften sufficiently to destroy effectiveness of the joint when subjected to a temperature of 160 deg. F. nor be soluble in any of the waste carried by the drainage system. Approximately 25 per cent of the joint space at the base of the socket shall be filled with jute or hemp. A pouring collar, rope or other device shall be used to hold the hot compound during pouring. Each joint shall be poured in one operation until the joint is filled. Joints shall not be tested until one hour after pouring.

4.2.7 **Precast Joints.** Precast collars shall be formed in both the spigot and bell of the pipe in advance of use. Collar surfaces shall be conical with side slopes of 3 deg. with the axis of the pipe and the length shall be equal to the depth of the socket. Prior to making joint contact, surfaces shall be cleaned and coated with solvents and adhesives as recommended by the manufacturer. When the spigot end is inserted in the collar, it shall bind before contacting the base of the socket. Material shall be inert and resistant to both acids and alkalies.

4.2.8 **Brazed Joints.** Brazed joints shall be made in accordance with the provisions of Section 6 of the Code for Pressure Piping ASA B31.1-1951.

4.2.9 **Cement Mortar Joints.** Cement mortar joints shall not be used in any piping controlled by this Code.

4.2.10 **Burned Lead Joints.** Burned (welded) lead joints shall be lapped and the lead shall be fused together to form a uniform weld at least as thick as the lead being joined.

4.2.11 **Asbestos Cement Sewer Pipe Joints.** Joints in asbestos cement pipe shall be made with sleeve couplings of the same composition as the pipe, sealed with rubber rings. Joints between asbestos cement pipe and metal pipe shall be made by means of an adapter coupling calked as required in paragraph 4.2.1.

4.2.12 **Bituminized Fiber Pipe Joints.** Joints in bituminized fiber pipe shall be made with tapered type couplings of the same material as the pipe. Joints between bituminized fiber pipe and metal pipe shall be made by means of an adapter coupling calked as required in paragraph 4.2.1.

4.2.13 **Plastic Pipe Joints.** See Sections 3.3, 3.4, and 3.5.

4.2.14 **Visible Ground Joint Connections.** Visible ground joint connections may be used on the inlet side of a fixture trap, within the trap seal. Visible ground joint connections shall not be used in any concealed piping or on the outlet side of the trap.

4.2.15 **Cold-Poured Joints.** Cold-poured bituminous or resin joints for clay or concrete sewer pipe shall not be used in lines below the water table.

4.3 USE OF JOINTS

4.3.1 **Clay Sewer Pipe.** Joints in vitrified clay pipe or between such pipe and metal pipe shall be made as provided in paragraphs 4.2.6 and 4.2.7, or 4.2.15, if applicable.

4.3.2 **Concrete Sewer Pipe.** Joints in concrete sewer pipe or between such pipe and metal pipe shall be made as in paragraphs 4.2.6 and 4.2.7, or 4.2.15, if applicable.

4.3.3 **Cast Iron Pipe.** Joints in cast iron pipe shall be either calked or screwed, as provided in paragraphs 4.2.1 and 4.2.2, or mechanical as per ASA A21.11-1953.

4.3.4 **Screw Pipe to Cast Iron.** Joints between wrought iron, steel, brass, or copper pipe, and cast iron pipe shall be either calked or threaded joints made as provided in paragraphs 4.2.1 and 4.2.2, or shall be made with approved adapter fittings.

4.3.5 **Lead to Cast Iron, Wrought Iron or Steel.** Joints between lead and cast iron, wrought iron, or steel pipe shall be made by means of wiped joints to a calking ferrule, soldering nipple, or bushing as provided in paragraph 4.2.3.

4.3.6 **Copper Water Tube.** Joints in copper tubing shall be made either by the appropriate use of approved brass or wrought copper water fittings, properly sweated or soldered together or by means of approved compression fittings as provided in paragraphs 4.2.4 and 4.2.5.

4.4 SPECIAL JOINTS

4.4.1 **Copper Tubing to Screwed Pipe Joints.** Joints from copper tubing to threaded pipe shall be made by the use of brass converter fittings. The joint between the copper pipe and the fitting shall be properly sweated or soldered, and the connection between the threaded pipe and the fitting shall be made with a standard pipe size screw joint.

4.4.2 **Welding or Brazing.** Brazing or welding shall be performed in accordance with requirements of recognized published standards of practice and by licensed or otherwise qualified mechanics, except when it is determined by the Administrative Authority to be equivalent procedure for the purpose of this Code.

4.4.3 **Slip Joints.** In drainage and water piping, slip joints may be used only on the inlet side of the trap or in the trap seal, and on the exposed fixture supply. Slip joints shall not be used in any concealed piping.

4.4.4 **Expansion Joints.** Expansion joints must be accessible and may be used where necessary to provide for expansion and contraction of the pipes.

4.4.5 **Ground Joint Brass Connections.** Ground joint brass connections which allow adjustment of tubing but provide a rigid joint when made up shall not be considered as slip joints.

4.4.6 **Dresser Type Couplings.** Dresser type couplings may be used in exposed water piping.

4.5 UNIONS (SCREWED)

4.5.1 **Drainage System.** Unions may be used in the trap seal and on the inlet side of the trap. Unions shall have metal-to-metal seats.

4.5.2 **Water-Supply System.** Unions in the water-supply system shall be metal-to-metal with ground seats.

4.6 WATER CLOSET, PEDESTAL URINAL, AND TRAP STANDARD SERVICE

4.6.1 Fixture connections between drainage pipes and water closets, floor-outlet service sinks, pedestal urinals, and earthenware trap standards, shall be made by means of brass, hard-lead, or iron flanges, calked, soldered, or screwed to the drainage pipe. The connection shall be bolted, with approved gasket or washer or setting compound between the earthenware and the connection. The floor flange shall be set on an approved firm base. The use of commercial putty or plaster is prohibited.

4.7 PROHIBITED JOINTS AND CONNECTIONS

4.7.1 **Drainage System.** Any fitting or connection which has an enlargement, chamber, or recess with a ledge, shoulder, or reduction of pipe area, that offers an obstruction to flow through the drain, is prohibited.

4.7.2 **No Fitting or connection** that offers abnormal obstruction to flow, shall be used. The enlargement of a 3-inch closet bend or stub to 4 inches shall not be considered an obstruction.

4.8 WATERPROOFING OF OPENINGS

4.8.1 Joints at the roof, around vent pipes, shall be made watertight by the use of lead, copper, or other approved flashings or flashing material. Exterior-wall openings shall be made watertight.

4.9 INCREASERS AND REDUCERS

4.9.1 Where different sizes of pipes, or pipes and fittings are to be connected, the proper size increasers or reducers or reducing fittings shall be made between the two sizes.

CHAPTER 5

TRAPS AND CLEANOUTS

5.1 TRAPS

5.1.1 Fixture Traps. All directly connected plumbing fixtures, excepting those having integral traps, shall be separately trapped by a water-seal trap, placed as close to the fixture outlet as possible.

(a) Provided, that a combination plumbing fixture may be installed on one trap, if one compartment is not more than 6 inches deeper than the other and the waste oulets are not more than 30 inches apart.

(b) Provided, that one trap may be installed for a set of not more than three single-compartment sinks or laundry trays or three lavatories immediately adjacent to each other in the same room, if the waste outlets are not more than 30 inches apart and the trap is centrally located when three compartments are installed.

5.1.2 Distance of Trap to Fixture. The vertical distance from the fixture outlet to the trap weir shall not exceed 24 inches.

5.2 TYPE AND SIZE OF TRAPS AND FIXTURE DRAINS

5.2.1 Trap Size. The size (nominal diameter) of trap for a given fixture shall be sufficient to drain the fixture rapidly but in no case less than given in Chapter 11, Table 11.4.2.

5.2.2 Relation to Fixture Drains. No "P" trap shall be larger than the fixture drain to which it is connected.

5.2.3 Type of Traps

(a) Fixture traps shall have a uniform interior and a smooth waterway, except as specifically approved in other sections of this Code, and shall be without partitions or movable parts, except cleanout plugs.

(b) Slip joints may be used only on the inlet side of the trap and in the trap seal, in exposed locations.

(c) Visible ground joint connections may be used on the inlet side of the trap, in the trap seal, and on the outlet side of the trap in exposed locations.

(d) A trap integral with the fixture shall have a uniform interior and smooth waterway.

5.2.4 Drum Traps

(a) Drum traps shall be 3 or 4 inches in diameter and shall be provided with a water seal of not less than 2 inches.
(b) The trap cleanout shall be one size less than the trap diameter.

5.3 GENERAL REQUIREMENTS

5.3.1 Trap Seal. Each fixture trap shall have a water seal of not less than 2 inches and not more than 4 inches, except where a deeper seal is required by the Administrative Authority for special conditions.

5.3.2 Trap Cleanouts

(a) Each fixture trap, except those cast integral or in combination with fixtures in which the trap seal is readily accessible or except when a portion of the trap is readily removable for cleaning purposes, shall have an accessible brass trap screw of ample size protected by this water seal.
(b) Cleanouts on the seal of a trap shall be made tight with threaded cleanout plug and approved washer.

5.3.3 Trap Level and Protection. Traps shall be set true with respect to their water seals and, where necessary, they shall be protected from freezing.

5.3.4 Traps Underground. Underground traps, except "P" traps into which floor drains with removable strainers discharge, shall be provided with accessible and removable cleanouts.

5.3.5 Building (House) Traps. No trap shall be installed at the foot of a soil or waste stack or in a building drain.

5.3.6 Prohibited Traps.

(a) No trap which depends upon the action of movable parts for its seal shall be used.
(b) Full "S" traps are prohibited.
(c) Bell traps are prohibited.
(d) Crown vented traps are prohibited except on fixture replacements.

5.3.7 Double Trapping. No fixture shall be double trapped.

5.4 PIPE CLEANOUTS

5.4.1 Location. Cleanouts shall be not more than 50 feet apart in horizontal drainage lines of 4-inch nominal diameter or less and not more than 100 feet apart for larger pipes under 8 inches in diameter.

5.4.2 Change of Direction. Cleanouts shall be installed at each change of direction of the building drain greater than 45 deg.

5.4.3. Large Pipes. For underground piping over 8 inches, manholes shall be provided and located at each 45 deg. or greater change in direction and at intervals of not more than 150 feet. Metal covers shall be provided for manholes. Manholes within buildings shall have gas-tight covers.

5.4.4 Underground Drainage. Cleanouts, when installed on an underground drain, shall be extended to or above the finished grade level directly above the place where the cleanout is installed; or may be extended to outside of the building when found necessary.

5.4.5 Concealed Piping. Cleanouts on concealed piping shall be extended through and terminate flush with the finished wall or floor; or pits or chases may be left in the wall or floor, provided they are of sufficient size to permit removal of the cleanout plug and proper cleaning of the system.

5.4.6 Base of Stacks. A cleanout shall be provided at, or no more than 3 feet above the foot of each vertical waste or soil stack.

5.4.7 Buildings with Floor Slabs. There shall be a yard cleanout accessibly located within 5 feet of the building wall or foundation.

5.4.8 Direction of Flow. Every cleanout shall be installed so that the cleanout opens in a direction opposite to the flow of the drainage line or at right angle thereto.

5.4.9 Cleanout plugs shall not be used for the installation of new fixtures or floor drains.

5.5 SIZE OF CLEANOUTS

5.5.1 Small Pipes. Cleanouts shall be of the same nominal size as the pipes up to 4 inches and not less than 4 inches for larger piping.

5.6 CLEANOUT CLEARANCES

5.6.1 **Large Pipes.** Cleanouts on 3-inch or larger pipes shall be so installed that there is a clearance of not less than 18 inches for the purpose of rodding.

5.6.2 **Small Pipes.** Cleanouts smaller than 3 inches shall be so installed that there is a 12-inch clearance for rodding.

5.6.3 **Concealment.** Where it is necessary to conceal a cleanout plug, a covering plate or access door shall be provided which will permit ready access to the plug.

5.7 CLEANOUT EQUIVALENT

5.7.1 A fixture trap or a fixture with integral trap, readily removable without disturbing concealed roughing work, may be accepted as a cleanout equivalent, if there is no more than one 90 deg. bend on the line to be rodded.

5.8 ACID-PROOF TRAPS

Where a vitrified-clay or other brittleware, acid-proof trap is installed underground, it shall be embedded in concrete to a thickness of 6 inches from the bottom and side of the trap.

CHAPTER 6

INTERCEPTORS—SEPARATORS AND BACKWATER VALVES

6.1 INTERCEPTORS AND SEPARATORS

6.1.1 When Required. Interceptors (including grease, oil, and sand interceptors, etc.) shall be provided when, in the opinion of the Administrative Authority, they are necessary for the proper handling of liquid wastes containing grease, flammable wastes, sand and other ingredients harmful to the building drainage system, the public sewer or sewage-treatment plant or processes.

6.1.2 Approval. The size, type, and location of each interceptor or separator shall be approved by the Administrative Authority and no wastes other than those requiring treatment or separation shall be discharged into any interceptor.

6.1.3 Prohibited Types. Water cooled or operated interceptors are prohibited.

6.1.4 No grease interceptor shall be hereinafter installed which does not comply, in all respects with the type or model of each size thereof approved by the Administrative Authority.

6.1.5 Separation. A mixture of light and heavy solids or liquids and solids having various specific gravities may be treated and then separated in an interceptor as approved by the Administrative Authority, in accordance with paragraph 6.1.2.

6.2 GREASE INTERCEPTORS

6.2.1 Commercial Buildings. A grease interceptor shall be installed in the waste line leading from sinks, drains, or other fixtures in the following establishments when, in the opinion of the Administrative Authority, a hazard exists: restaurants, hotel kitchens or bars, factory cafeterias or restaurants, clubs, or other establishments where grease can be introduced into the drainage system in quantities that can affect line stoppage or hinder sewage disposal.

6.2.2 Residential Units. A grease interceptor is not required for individual dwelling units or any private living quarters.

6.3 OIL SEPARATORS

6.3.1 An oil separator shall be installed in the drainage system or section of the system where, in the opinion of the Administrative Authority, a hazard exists or where oils or other flammables can be introduced or admitted into the drainage system by accident or otherwise.

6.4 SAND INTERCEPTORS

6.4.1 **Commercial Installations.** Sand and similar interceptors for heavy solids shall be so designed and located as to be readily accessible for cleaning, and shall have a water seal of not less than 6 inches.

6.5 VENTING INTERCEPTORS

6.5.1 **Relief Vent.** Interceptors shall be so designed that they will not become air bound if closed covers are used.

6.6 ACCESSIBILITY OF INTERCEPTOR

6.6.1 Each interceptor shall be so installed as to provide ready accessibility to the cover and means for servicing and maintaining the interceptor in working and operating condition. The use of ladders or the removal of bulky equipment in order to service interceptors shall constitute a violation of accessibility.

6.7 INTERCEPTOR'S EFFICIENCY

6.7.1 **Flow Rate.** Interceptors shall be rated and approved for their efficiency as directed by the Administrative Authority and in accordance with generally accepted practice.

6.7.2 **Approval.** No grease interceptor shall be approved until it has successfully passed the testing and rating procedure set up by the Administrative Authority.

6.8 LAUNDRIES

6.8.1 **Interceptors.** Commercial laundries shall be equipped with an interceptor having a removable wire basket or similar device that will prevent strings, rags, buttons or other materials detrimental to the public sewerage system from passing into the drainage system.

6.8.2 **Intercepting Device.** A basket or device shall prevent passage into the drainage system of solids ½ inch or larger in size. The basket or device shall be removable for cleaning purposes.

6.9 BOTTLING ESTABLISHMENTS

6.9.1 **Bottling Plants.** Bottling plants shall discharge their process wastes into an interceptor which will provide for the separation of broken glass or other solids, before discharging liquid wastes into the drainage system.

6.10 SLAUGHTER HOUSES

6.10.1 **Separators.** Slaughtering-room drains shall be equipped with separators which shall prevent the discharge into the drainage system of feathers, entrails, and other materials likely to clog the drainage system.

6.10.2 **Interceptors.** Slaughtering and dressing room drains shall be provided with interceptors approved by the Administrative Authority, in accordance with paragraph 6.1.2.

6.10.3 **Food Grinder.** Wastes may discharge directly to the building drainage system with the permission of the Administrative Authority.

6.11 FOOD—WASTE GRINDERS

6.11.1 **Approval.** When so required by the Administrative Authority permission must be obtained for the installation of food-waste grinders.

6.11.2 **Commercial.** Where food waste grinders are installed in commercial establishments the waste from those units may discharge direct into the building drainage system and not through a grease interceptor, except as directed by the Administrative Authority. The Administrative Authority shall determine where and what type of interceptor is required.

6.11.3 **Residential.** Where food-waste grinders are installed for residential use the waste from those units shall discharge direct into the building drainage system and not through a grease interceptor.

6.12 MAINTENANCE

6.12.1 Cleaning. Interceptors shall be maintained in efficient operating condition by periodic removal of accumulated grease.

6.13 OIL INTERCEPTORS

6.13.1 Where Required. Oil separators shall be installed when required by the Administrative Authority and shall conform to requirements of paragraph 6.13.2.

6.13.2 Minimum Dimension. Oil separators shall have a depth of not less than 2 feet below the invert of the discharge drain.

6.13.3 Motor Vehicle Storage. Interceptors shall have a capacity of 6 cubic feet where not more than three vehicles are serviced and one cubic foot in net capacity shall be added for each additional vehicle up to ten vehicles. Where more than ten vehicles are serviced and stored, the Administrative Authority shall determine the size of the separator required.

6.13.4 Motor Vehicle Servicing. Where storage facilities are not maintained, as in repair shops, the capacity of the separator shall be based on a net capacity of 1 cubic foot for each 100 square feet of surface to be drained into the interceptor with a minimum capacity of 6 cubic feet.

6.13.5 Special Type Separators. Before installing any special type separator a drawing including all pertinent information shall be submitted for approval of the Administrative Authority, as being in accordance with this code.

6.14 BACKWATER VALVES

6.14.1 Installation. Backwater valves shall be installed only on those branches which are below ground level, and only if such branches are subject to backflow or backpressure and permission must be obtained from the Administrative Authority for and prior to said installation.

6.14.2 Fixture Branches. Backwater valves shall be installed in the branch of the building drain which receives only the discharge from fixtures located within such branch and below grade.

6.14.3 **Material.** Backwater valves shall have all bearing parts of corrosion-resistant material.

6.14.4 Backwater valves shall be so constructed as to insure a mechanical seal against backflow.

6.14.5 **Diameter.** Backwater valves, when fully opened, shall have a capacity not less than that of the pipes in which they are installed.

6.14.6 **Location.** Backwater valves shall be so installed as to provide ready accessibility to their working parts.

CHAPTER 7

PLUMBING FIXTURES

7.1 GENERAL REQUIREMENTS—MATERIALS

7.1.1 **Quality of Fixtures.** Plumbing fixtures shall be constructed from approved materials, have smooth impervious surfaces, be free from defects and concealed fouling surfaces, and except as permitted elsewhere in this Code, shall conform in quality and design to one of the following standards:

Staple Porcelain Plumbing Fixtures, United States Department of Commerce, Commercial Standard CS 4-29.

Vitreous China Plumbing Fixtures, United States Department of Commerce, Commercial Standard CS 20-56.

Plumbng Fixtures (for) Land Use, Federal Specification WW-P-541a-1947.

Formed Metal Porcelain Enameled Sanitary Ware, United States Department of Commerce, Commercial Standards CS 144-47.

7.2 ALTERNATE MATERIALS

7.2.1 **Materials.** Sinks and special fixtures may be made of soapstone, chemical stoneware, or may be lined with lead, copper-base alloy, nickel-copper alloy, corrosion-resisting steel or other materials especially suit to the use for which the fixture is intended.

7.3 OVERFLOWS

7.3.1 **Design.** When any fixture is provided with an overflow, the waste shall be so arranged that the standing water in the fixture cannot rise in the overflow when the stopper is closed or remain in the overflow when the fixture is empty.

7.3.2 **Connection.** The overflow pipe from a fixture shall be connected on the house or inlet side of the fixture trap, except that overflows of flush tanks may discharge into the water closets or urinals served by them, but it shall be unlawful to connect such overflows with any other part of the drainage system.

7.4 INSTALLATION

7.4.1 **Cleaning.** Plumbing fixtures shall be installed in a manner to afford easy access for cleaning. Where practical, all pipes from fixtures shall be run to the nearest wall.

7.4.2 **Joints.** Where fixture comes in contact with wall and floors, the joint shall be watertight.

7.4.3 **Securing Fixtures.** Floor-outlet fixtures shall be rigidly secured to floor by screws or bolts.

7.4.4 **Wall-Hung Bowls.** Wall-hung water-closet bowls shall be rigidly supported by a concealed metal supporting member so that no strain is transmitted to the closet connection.

7.4.5 **Setting.** Fixtures shall be set level and in proper alignment with reference to adjacent walls. (See par. 4.6.1)

7.5 WATER-SUPPLY PROTECTION

7.5.1 **Supply Fittings.** The supply lines or fittings for every plumbing fixture shall be so installed as to prevent backflow. (See paragraph 10.4.3)

7.6 PROHIBITED FIXTURES AND CONNECTIONS

7.6.1 **Fixtures.** Pan, valve, plunger, offset, washout, latrine, frostproof, and other water closets having an invisible seal or an unventilated space or having walls which are not thoroughly washed at each discharge, shall be prohibited. Any water closet which might permit siphonage of the contents of the bowl back into the tank shall be prohibited.

7.7 WATER CLOSETS

7.7.1 **Public Use.** Water-closet bowls for public use shall be of the elongated type.

7.7.2 **Flushing Device.** Water-closet tanks shall have a flushing capacity sufficient to properly flush the water-closet bowls with which they are connected.

7.7.3 **Ballcocks.** Ballcocks for flush tanks shall be of the anti-siphon type, properly installed, and having a provision for trap refill.

7.7.4 **Close-Coupled Tanks.** The flush-valve seat in close-coupled water-closet combinations shall be 1 inch or more above the rim of the bowl, so that the flush-valve will close even if the closet trapway is clogged. Any closets with flush valve seats less than one inch above the rim of the bowl are prohibited.

7.7.5 **Automatic Flush Valve.** Flushometers shall be so installed that they will be readily accessible for repairing. When the valve is operated, it shall complete the cycle of operation automatically, opening fully and closing positively under the service pressure. At each operation the valve shall deliver water in sufficient volume and at a rate that will thoroughly flush the fixture and refill the fixture trap. Means shall be provided for regulating flush-valve flow. Not more than one fixture shall be served by a single flush valve. Protection against backflow shall be provided by a satisfactory blackflow preventer as specified in paragraphs 7.5 and 10.5.1.

7.7.6 **Seats.** Water closets shall be equipped with seats of smooth non-absorbent material. All seats of water closets provided for public use shall be of the open-front type. Water closets with integral seats shall not be installed for public use, but may be in stalled, in certain institutions and prisons with the permission of the Administrative Authority or other Authority having jurisdiction.

7.7.7 **Location.** No water closet shall be located in a room or compartment which has less than 5 foot candles of illumination at floor level, and/or which is not ventilated to the atmosphere, either forced draft or direct opening.

7.8 URINALS

7.8.1 **Automatic Flushing Tank.** Tanks flushing more than one urinal shall be automatic in operation and of sufficient capacity to provide the necessary volume to flush and properly cleanse all urinals simultaneously, not less than 4 times per hour.

7.8.1.1 **Float Valves.** Float valves or ballcocks for flush tanks shall be of the anti-siphon type, properly installed, and having a provision for trap refill if serving a urinal incorporating a reverse trap.

7.8.2 **Urinals Equipped with Automatic Flush Valves.** Flushometer shall be as prescribed in paragraph 7.7.5 and no valve shall be used to flush more than one urinal. Protection against backflow

shall be provided by a satisfactory backflow preventer as specified in paragraphs 7.5 and 10.5.1.

7.8.3 **Trough Urinals.** Trough urinals shall be not less than 6 inches deep and shall be furnished with one-piece backs and have strainers with outlets at least 1½ inches in diameter. The washdown pipe shall be perforated so as to flush with an even curtain of water against the back of the urinal. This pipe shall be securely clamped as high as practicable to the back of the urinal. Trough urinals shall have tanks with a flushing capacity of not less than 1½ gallons of water for each 2 feet of urinal length. Protection against backflow shall be provided as specified in paragraph 10.5.3.

7.8.4 **Equivalent Length.** Trough urinals shall be figured on the basis of one (1) urinal for each 18 inches of length, i.e.

24 in. trough equals 1 urinal
36 in. trough equals 2 urinals
48 in. trough equals 2 urinals
60 in. trough equals 3 urinals
72 in. trough equals 4 urinals

7.8.5 **Backflow Protection.** All urinals not otherwise specified shall be protected against backflow as specified in paragraph 10.4.3.

7.8.6 **Floor-type Urinals.** Floor-type trough urinals are prohibited.

7.8.7 **Surrounding Materials.** Wall and floor space to a point one foot in front of urinal lip and 4 feet above the floor, and a least, one foot to each side of the urinal shall be lined with nonabsorbent material.

7.8.8 **Location.** No urinal shall be located in a room or compartment which has less than 5 foot candles of illumination of floor level and/or which is not vented to the atmosphere, either forced draft or direct opening.

7.9 STRAINERS AND FIXTURE OUTLETS

7.9.1 All plumbing fixtures, other than water closets and siphon-action washdown or blowout urinals, shall be provided with metal strainers having waterway area complying with paragraph 7.1.1.

7.10 LAVATORIES

7.10.1 **Waste Outlets.** Lavatories shall have waste outlets not less than 1¼ inches in diameter. Wastes may have open strainers or may be provided with stoppers.

7.11 SHOWER RECEPTORS AND COMPARTMENTS

7.11.1 **Shower.** All shower compartments, except those built directly on the floor slab or those having metal enameled or precast receptors, shall have a lead or copper shower pan or the equivalent thereof. The pan shall turn upon all sides at least 2 inches above finished floor level. Traps shall be so constructed that the pan my be securely fastened to the trap at the seepage entrance making a watertight joint between the pan and trap. Shower receptacle waste outlets shall be not less than 2 inches in diameter and have a removable strainer.

7.11.2 **On the Ground.** Shower receptors built on the ground shall be constructed from dense nonabsorbent and noncorrosive materials and shall have smooth impervious surfaces, or as provided in paragraph 7.11.1.

7.11.3 **Dimensions.** Shower compartments shall have not less than 1,024 square inches in floor area and, if rectangular, square, or triangular in plan, shall be not less than 30 inches in shortest dimension.

7.11.4 **Construction.** Floors under shower compartments shall be laid on a smooth and structurally sound base and shall be lined and made watertight with sheet lead, copper or other acceptable materials. Pans shall be pitched to drain and shall not be installed in direct contact with a wood floor. Shower compartments located in basements, cellars, or in other rooms in which the floor has been laid directly on the ground surface need not be lined.

7.11.5 **Public or Institution Showers.** Floors of public shower rooms shall be drained in such a manner that no waste water from any shower head will pass over areas occupied by other bathers.

7.11.6 **Walls.** Shower compartments shall have walls constructed of smooth, noncorrosive and nonabsorbent waterproof materials to a height of not less than 6 feet above the floor.

7.11.7 **Joints.** Built-in tubs with overhead showers shall have waterproof joints between the tub and waterproof wall.

7.12 SINKS

7.12.1 **Waste Outlets.** Sinks shall be provided with waste outlets not less than 1½ inches in diameter. Waste outlets may have open strainers or may be provided with stoppers.

7.12.2 **Food Grinders.** Sinks on which a food grinder is installed shall have a waste opening not less than 3½ inches in diameter.

7.13 FOOD-WASTE-GRINDER UNITS

7.13.1 **Separate Connections.** Domestic food-waste-disposal units shall be connected and trapped separately from any other fixture or compartment. Units may have either automatic or hand-operated water supply control. (See paragraph 10.4)

7.13.2 **Grease Interceptors.** No food-waste grinder shall be connected through a grease interceptor.

7.13.3 **Commercial-type Grinders.** Commercial-type food-grinders shall be provided with not less than a 2-inch waste line. Each waste shall be trapped and vented as provided in other sections of this Code.

7.14 DRINKING FOUNTAINS

7.14.1 **Design and Construction.** Drinking fountains shall conform to American Standard Specifications for Drinking Fountains. (ASA Z4.2-1942.)

7.14.2 **Protection of Water Supply.** Stream projectors shall be so assembled as to provide an orifice elevation as specified by American Standard Air Gaps in Plumbing Systems (ASA A40.4-1942) and American Standard Backflow Preventers in Plumbing Systems (ASA A40.6-1943) as follows:

(a) Minimum Elevation. All drinking fountain nozzles including those which may at times extend through a water surface with orifice not greater than 7/16 (0.440) inch diameter or 0.150 square inch area shall be placed so that the lower edge of the nozzle orifice is at an elevation not less than ¾ inch above the flood level rim of the receptacle.

(b) The ¾ inch elevation shall also apply to nozzles with more than one orifice, provided that the sum of the area of all orifices shall not exceed the area of a circle 7/16 inch in diameter.

7.14.3 **Material.** The fountain should be constructed of impervious material, such as vitreous china, porcelain, enameled cast iron, other metals, or stoneware.

7.14.4 **Installation.** The jet of the fountain should issue from a nozzle of nonoxidizing, impervious material set at an angle from the vertical such as to prevent the return of water in the jet to the orifice or orifices from whence the jet issues. The nozzle and every other opening in the water pipe or conductor leading to the nozzle should be above the edge of the bowl, so that such nozzle or opening cannot be flooded in case a drain from the bowl of the fountain becomes clogged.

7.14.5 **Protection.** The end of the nozzle should be protected by nonoxidizing guards to prevent the mouth and nose of the user from coming into contact with the nozzle. Guards should be so designed that the possibility of transmission of infection by touching the guards is reduced to a minimum.

7.14.6 **Spattering.** The inclined jet of water issuing from the nozzle should not touch the guard, and thereby cause spattering.

7.14.7 **Cleansing.** The bowl of the fountain should be so designed and proportioned as to be free from corners which would be difficult to clean or which would collect dirt.

7.14.8 **Splashing.** The bowl of the fountain should be so proportioned as to prevent unnecessary splashing at a point where the jet falls into the bowl.

7.14.9 **Traps.** The drain from the fountain should not have a direct physical connection with a waste pipe, unless the drain is trapped.

7.14.10 **Flow Regulator.** The water-supply pipe should be provided with an adjustable valve fitted with a loose key stop or an automatic valve permitting the regulation of the rate of flow of water to the fountain so that the valve manipulated by the users of the fountain will merely turn the water on or off.

7.14.11 **Height.** The height of the fountain at the drinking level should be such as to be most convenient to persons using the fountain. The provision of several step-like elevations to the floor at fountains will permit children of various ages to utilize the fountain.

7.14.12 **Flow.** The waste opening and pipe should be of sufficient size to carry off the water promptly. The opening should be provided with a strainer.

7.14.13 **Location.** Drinking fountain bubblers shall not be installed as an integral part of or connected to any other fixture such as a lavatory or sink.

7.14.14 **Special conditions** and certain other materials related to drinking fountains shall meet requirements as set forth in American Standard A40.4-1943 and American Standard ASA Z4.2, respectively.

7.15 FLOOR DRAINS

7.15.1 **Trap and Strainers.** Floor drains shall have metal traps and a minimum water seal of 3 inches and shall be provided with removable strainers. The open area of strainer shall be at least two-thirds of the cross-sectional area of the drain line to which it connects.

7.16 DISHWASHING MACHINES

7.16.1 **Protection.** Domestic dishwashing machines shall meet requirements in paragraph 10.4.3.

7.16.2 **Separate Trap.** Each unit shall be separately trapped or discharge indirectly into a properly trapped and vented fixture.

7.16.3 **Air Gap.** Commercial dishwashing machines shall be connected through an air gap or as provided in Chapter 9 "Indirect Waste Piping and Special Wastes."

7.16.4 **Hot Water.** Dishwashing machines or similar dishwashing equipment not in private living quarters or dwelling units shall be provided with water at 180 deg. F for sterilization.

7.17 MULTIPLE WASH SINKS

7.17.1 **Circular Type.** Each 18 inches of wash sink circumference (circular type) shall be equivalent to one lavatory.

7.17.2 **Straight-Line Type.** Multiple wash sinks of the straight-line type shall have hot and cold combination spouts not closer than 18 inches from adjacent similar spouts and each spout shall be considered the equivalent of one lavatory.

7.18 GARBAGE-CAN WASHERS

7.18.1 **Discharge.** Garbage-can washers shall not discharge through a trap serving any other device or fixture.

7.18.2 **Grease Interceptor.** The discharge from a garbage-can washer shall be connected through a grease interceptor.

7.18.3 **Baskets.** The receptacle receiving the wash from garbage cans shall be provided with a basket or similar device to prevent the discharge of large particles into the building drainage system.

7.18.4 **Connections.** Water Supply connections shall conform to paragraph 10.4.3.

7.19 LAUNDRY TRAYS

7.19.1 **Waste Outlets.** Each compartment of a laundry tray shall be provided with a waste outlet not less than 1½ inches in diameter and with a stopper.

7.19.2 **Overflow.** Laundry-tray overflows shall conform to the requirements of paragraph 7.3.1.

7.20 SPECIAL FIXTURES AND SPECIALTIES

7.20.1 **Water and Drain Connections.** Baptistries, ornamental and lily pools, aquaria, ornamental fountain basins and similar constructions when provided with water supplies shall be protected from backsiphonage as required in paragraph 10.4.3.

7.20.2 **Approval.** Specialties requiring water and waste connections shall be submitted for approval of the Administrative Authority.

7.21 MINIMUM FACILITIES

7.21.1 Wherever plumbing fixtures are installed, the minimum number of each type of fixture installed shall be in accordance with Table 7.21.2, unless otherwise specifically provided. At least half of the required number of fixtures in any installation shall be free. Where only one fixture is required, that fixture shall be free.

Table 7.21.2 MINIMUM FACILITIES[1]

Type of Building or Occupancy[2]	Water Closets		Urinals	Lavatories[3]		Bathtubs or Showers	Drinking Fountains[4]
Dwelling or apartment houses[5]	1 for each dwelling or apartment unit			1 for each apartment or dwelling unit		1 each for apartment or dwelling unit	
Schools	Male	Female	1 per 30 male See Footnote 7	1 per 50 persons			1 per 75 persons
	1 per 50	1 per 25					
Office or Public Buildings	No. of Persons	No. of Fixtures	Wherever urinals are provided, one water closet less than the number specified may be provided for each urinal installed except that the number of water closets in such cases shall not be reduced to less than ⅔ of the minimum specified	No. of Persons	No. of Fixtures		1 for each 75 persons
	1-15	1		1-15	1		
	16-35	2		16-35	2		
	36-55	3		36-60	3		
	56-80	4		61-90	4		
	81-110	5		91-125	5		
	111-150	6					
	1 fixture for each 40 additional persons			1 fixture for each 45 additional persons			
Manufacturing, warehouses, workshops, loft buildings, foundries and similar establishments[6]	To be in accordance with Rule "G" of the Health and Safety Act administered by the Illinois State Department of Labor						

Table 7.21.2. MINIMUM FACILITIES (Continued)

Type of Building or Occupancy[2]	Water Closets	Urinals	Lavatories[3]	Bathtubs or Showers	Drinking Fountains[4]
Dormitories[6]	Male: 1 for each 10 persons Female: 1 for each 8 persons Over 10 persons, add 1 fixture for each 25 additional males and 1 for each 20 additional females	1 for each 25 men Over 150 persons, add 1 fixture for each additional 50 men See Footnote 7	1 for each 12 persons (Separate dental lavatories should be proivded—one for each 50 persons is recommended.) Add 1 lavatory for each 20 males, 1 for each 15 females.	1 for each 8 persons. In the case of women's dormitories, additional bathtubs should be installed at the ratio of 1 for each 30 females.	1 for each 75 persons
Theatres, Auditoriums	No. of Persons / No. of Fixtures: Male / Female 1-100: 1 / 1 101-200: 2 / 2 201-400: 3 / 3 Over 400, add 1 fixture for each additional 500 males and 1 for each 300 females	No. of Persons (Male) / No. of Fixtures 1-200: 1 201-400: 2 401-600: 3 Over 600, 1 for each additional 300 males See Footnote 7	No. of Persons / No. of Fixtures 1-200: 1 201-400: 2 401-750: 3 Over 750, 1 for each additional 500 persons		1 for each 100 persons Over 1,000 add 1 fixture for each additional 1,000

Table 7.21.2 MINIMUM FACILITIES[1] (Concluded)

GENERAL. In applying this schedule of facilities, consideration must be given to the accessibility of the fixtures. Conformity purely on a numerical basis may not result in an installation suited to the need of the individual establishment. For example, schools should be provided with toilet facilities on each floor having classrooms. Temporary workingmen's facilities:

1 water closet and 1 urinal for each 30 workmen.

24-in. urinal trough = 1 urinal.
36-in. urinal trough = 2 urinals.
48 in. urinal trough = 2 urinals.
60 in. urinal trough = 3 urinals.
72 in. urinal trough = 4 urinals.

1. The figures shown are based upon one fixture being the minimum required for the number of persons indicated or any fraction thereof.

2. Building category not shown on this table will be considered separately by the Administrative Authority.

3. 24 lineal inches of wash sink or 18 inches of a circular basin, when provided with water outlets for such space, shall be considered equivalent to 1 lavatory.

4. Drinking fountain bubbles shall not be installed in conjunction with, or connected to a handwashing lavatory.

5. Laundry trays—one single compartment tray for each dwelling unit or 2 compartment trays for each 10 apartments. Kitchen sinks—1 for each dwelling or apartment unit.

6. Laundry trays, 1 for each 50 persons. Slop sinks, 1 for each 100 persons.

7. Urinals may be substituted for water closets for females, not to exceed $\frac{1}{3}$ of the required total number of water closets.

CHAPTER 8

HANGERS AND SUPPORTS

8.1 STRAIN AND STRESSES

8.1.1 General. Piping in a plumbing system shall be installed without undue strains and stresses and provision shall be made for expansion, contraction, and structural settlement.

8.2 VERTICAL PIPING

8.2.1 Attachment. Vertical piping shall be secured at sufficiently close intervals to keep the pipe in alignment and carry the weight of the pipe and contents.

8.2.2 Cast-Iron Soil Pipe. Cast-iron soil pipe shall be supported at not less than at every story height and at its base. Supports shall be of ferrous material.

8.2.3 Screwed Pipe. Screwed pipe (SPS) shall be supported at not less than every other story height. Supports shall be of ferrous material.

8.2.4 Copper Tubing. Copper tubing shall be supported at each story for piping 1½ inches and over and at not more than 4-foot intervals for piping 1¼ inches and smaller. Supports shall be of copper material.

8.2.5 Lead Pipe. Lead pipe shall be supported at intervals not exceeding 4 feet. Supports shall be of lead material.

8.2.6 Plastic Pipe. Plastic pipe shall be supported at not less than every story height and at its base.

8.3 HORIZONTAL PIPING

8.3.1 Supports. Horizontal piping shall be supported at sufficiently close intervals to keep it in alignment and prevent sagging.

8.3.2 Cast-Iron Soil Pipe. Cast-iron soil pipe shall be supported at not more than 5-foot intervals. Supports shall be of ferrous material.

8.3.3 **Screwed Pipe.** Screwed pipe (SPS) shall be supported at approximately 12-foot intervals. Supports shall be of ferrous material.

8.3.4 **Copper Tubing.** Copper tubing shall be supported at approximately 6-foot intervals for piping 1½ inches and smaller and 10-foot intervals for piping 2 inches and larger. Supports shall be of copper material.

8.3.5 **Lead Pipe.** Lead pipe shall be supported by strips or otherwise for its entire length. Metallic supports in contact with the pipe shall be of lead material.

8.3.6 **Plastic Pipe.** Plastic pipe shall be supported at intervals of not less than 6 feet.

8.3.7 **In Ground.** Piping in the ground shall be laid on a firm bed for its entire length, except where support is otherwise provided which is adequate in the judgment of the Administrative Authority.

8.4 HANGERS AND ANCHORS

8.4.1 **Material.** Hangers and anchors shall be of metal of sufficient strength to maintain their proportional share of the pipe alignments and prevent rattling. The metal of the hanger or anchor shall be the same as that of the pipe.

8.4.2 **Attachment.** Hangers and anchors shall be securely attached to the building construction.

8.5 STRAINS AND STRESSES

8.5.1 **Installation of Pipe.** Piping in a plumbing system shall be so installed as to prevent undue strains and stresses.

8.5.2 **Expansion and Contraction.** Provision shall be made for expansion and contraction of piping and for structural settlement that may affect the piping.

8.5.3 **Piping in Concrete.** Piping in concrete or masonry walls or footings shall be placed or installed in chases or recesses which will permit access to the piping for repair or replacement, and shall be protected in accordance with paragraph 2.10.1.

8.6 BASE OF STACKS

8.6.1 **Supports.** Bases of cast-iron soil stacks shall be supported on concrete, brick laid in cement mortar, metal brackets attached to the building construction, or by other methods approved by the Administrative Authority.

8.6.2 **Piping Material.** Other piping material shall be so anchored as to take the load off the stack at the base.

CHAPTER 9

INDIRECT WASTE PIPING AND SPECIAL WASTES

9.1 INDIRECT WASTE PIPING

9.1.1 General. Wastes from the following shall discharge to the building drainage system through an air gap serving the individual fixtures, devices, appliances or apparatus.

9.1.2 Food Handling. Establishments engaged in the storage, preparation, selling, serving, processing, or otherwise handling of food shall have the waste piping from all refrigerators, ice boxes, cooling or refrigerant coils, steam tables, egg boilers, coffee urns, potato peelers, vegetable sinks or similar equipment discharge indirectly into a water-supplied sink or receptor and the water outlet shall terminate at least 2 inches above the flood rim of such sink or receptor, which shall not be concealed.

9.1.3 Commercial Dishwashing Machines and Fixtures. Dishwashing machines and sinks, pot-washing sinks, glass washers and other similar fixtures, except those in private living quarters or dwelling units, shall be indirectly connected, except when located adjacent to a floor drain, whereby the waste may be connected direct on the sewer side of the floor drain trap, provided that the distance from the floor to the bottom of the washer tank or sink is greater than the distance from the floor to the top dip of the floor drain trap. The waste shall be trapped, and revented if required by Table 12.9.3.

9.1.4 Interceptor. An interceptor may be placed on the outlet side of the dishwashing machine, or on the discharge side of the indirect waste receptor.

9.1.5 Connection. Indirect waste connections shall be provided for drains, overflows, or relief vents from the water-supply system.

9.1.6 Sterile Materials. Appliances, devices, or apparatus such as stills, sterilizers, and similar equipment requiring water and waste connections and used for sterile material shall be indirectly connected or provided with an air gap between the trap and the appliance.

9.1.7 **Drips.** Appliances, devices, or apparatus not regularly classed as plumbing fixtures but which have drips or drainage outlets, may be drained by indirect waste pipes discharging into an open receptacle as provided in paragraph 9.1.2.

9.1.8 **Cleaning.** Indirect waste piping shall be so installed as to permit ready access for flushing and cleansing.

9.2 MATERIAL AND SIZE

9.2.1 The material and size of indirect waste pipes shall be in accordance with the provisions of the other sections of this Code applicable to sanitary-drainage piping.

9.3 LENGTH AND SLOPE

9.3.1 **Maximum Length.** The maximum length of the indirect waste to vent shall not exceed 15 feet.

9.3.2 **Minimum Slope.** Indirect waste pipes shall be installed at a uniform slope, but at slopes not less than permitted in paragraphs 11.3.2, 11.3.3, and 11.3.4.

9.4 AIR GAP OR BACKFLOW PREVENTER

9.4.1 **Provision of Air Gap.** The air gap between the indirect waste and the building drainage system shall be at least twice the effective diameter of the drain served and shall be as provided in (a) and (b) below:

(a) By extending the indirect waste pipe to an open, accessible slop sink, floor drain, or other suitable fixture which is properly trapped or vented. The indirect waste shall terminate a sufficient distance above the flood level rim of the receiving fixture to provide the required air gap, and shall be installed in accordance with other applicable sections of this Code.

(b) By providing a break (air gap) in the drain connection on the inlet side of the trap serving the fixture, device, appliance, or apparatus.

9.5 RECEPTORS

9.5.1 **Installation.** Waste receptors serving indirect waste pipes shall not be installed in any toilet room, nor in any inaccessible or unventilated space such as a closet or storeroom, nor otherwise concealed.

9.5.2 **Cleanout Location.** If the indirect waste receptor is set below floor level, it shall be equipped with a running trap adjacent to the sink with cleanout brought level with the floor.

9.5.3 **Strainers and Baskets.** Every indirect waste receptor shall be equipped either with a readily removable metal basket over which all indirect waste pipe shall discharge, or the indirect waste receptor outlet shall be equipped with a beehive strainer not less than 4 in. in height.

9.5.4 **Splashing.** All plumbing receptors receiving the discharge of indirect waste pipes, shall be of such shape and capacity as to prevent splashing or flooding. No plumbing fixture which is used for domestic or culinary purposes shall be used to receive the discharge of an indirect waste pipe.

9.6 CLEAR WATER WASTES

9.6.1 Water lifts, expansion tanks, cooling jackets, sprinkler systems, drip or overflow pans, or similar devices which waste clear water only shall discharge onto a roof or into the building drainage system through an indirect waste.

9.7 CONDENSERS AND SUMPS

9.7.1 No steam pipe shall connect to any part of a drainage or plumbing system, nor shall any water above 180 degrees F. be discharged into any part of a drainage system. Such pipes may be indirectly connected by discharging through an interceptor into the drainage system.

9.8 DRINKING FOUNTAINS

9.8.1 Drinking fountains may be installed with indirect wastes only in existing structures.

9.9 SPECIAL WASTES

9.9.1 **Acid Waste.** Acid and chemical indirect waste pipes shall be of materials unaffected by contact with the specific wastes to be discharged.

9.9.2 **Neutralizing Device.** In no case shall corrosive liquids, spent acids, or other harmful chemicals which might destroy or injure a drain, sewer, soil or waste pipe, or which might create noxious or toxic fumes, discharge into the plumbing system with-

out being thoroughly diluted or neutralized by passing through a properly constructed and acceptable dilution or neutralizing device. Such device shall be automatically provided with a sufficient intake of diluting water or neutralizing medium, so as to make its contents noninjurious before being discharged into the soil or sewage system.

9.10 SWIMMING POOLS

9.10.1 Piping carrying waste water from swimming or wading pools including pool drainage, back wash from filters, water from scum gutter drains or floor drains which serve walks around pools, shall be installed as an indirect waste utilizing any existing circulation pump, if necessary, when indirect waste line is below the sewer grade.

CHAPTER 10

WATER SUPPLY AND DISTRIBUTION

10.1 QUALITY OF WATER SUPPLY

10.1.1 Potable Water. Potable water is water which is satisfactory for drinking, culinary, and domestic purposes, and meets the requirements of the Health Authority having jurisdiction.

10.1.2 All Premises intended for human habitation, occupancy, or use shall be provided with a supply of pure and wholesome water, neither connected with unsafe water supplies nor subject to the hazards of backflow or back siphonage. Where a public supply of potable water is not available, requirements satisfactory to the Administrative Authority shall be observed.

10.1.3 Nonpotable Water. Nonpotable water may be used for the flushing of water closets, urinals, and other fixtures only when there is an inadequate supply of potable water for this purpose, and only with the approval of the Administrative Authority. Such water shall not be accessible for drinking or culinary purposes, and there shall be no physical connection of any kind between the potable and nonpotable systems. See Section 10.2.

10.2 COLOR CODE

10.2.1 Identification of Piping. All piping conveying nonpotable water shall be adequately and durably identified by a distinctive yellow-colored paint so that it is readily distinguished from piping carrying potable water. (See ASA Z53.1-1945 Safety Color Code for Marking Physical Hazards and ASA A13.1-1956 Scheme for the Identification of Piping Systems.)

10.3 WATER SUPPLY MANDATORY

10.3.1 Every building in which plumbing fixtures are installed and are for human use, occupancy, or habitation shall be provided with an ample supply of pure and wholesome water.

10.4 PROTECTION OF POTABLE WATER SUPPLY

10.4.1 Cross Connections. Potable water-supply piping, water discharge outlets, backflow prevention devices or similar equipment shall not be so located as to make possible their submergence in any contaminated or polluted liquid or substance.

10.4.2 Approval of Devices. Before any device for the prevention of backflow or back siphonage is installed, it shall have first been certified as meeting the requirements of ASA A40.6-1943 by a recognized testing laboratory acceptable to the Administrative Authority. Devices installed in a potable water supply for protection against backflow shall be maintained in good working condition by the person or persons having control of such devices. The Administrative Authority having jurisdiction may inspect such devices and, if found to be defective or inoperative, shall require the replacement thereof.

10.4.3 Backflow. The water-distributing system shall be protected against backflow. Every water outlet shall be protected from backflow, preferably by having the outlet end from which the water flows spaced a distance above the flood-level rim of the receptacle into which the water flows sufficient to provide a "minimum required air gap," as defined in ASA A40.4-1942. Where it is not possible to provide a minimum air gap, the water outlet shall be equipped with an accessibly located backflow preventer complying with ASA A40.6-1943, installed on the discharge side of the final control valve.

10.4.4 Prohibited Connections.

(a) Chemical, Contaminated Water, or Sewage Lines or Vessels. There shall be no direct connection between potable water lines and lines, equipment or vessels containing raw or contaminated water, contaminating chemicals or sewage. Such connections shall be made only through a minimum air gap as outlined in paragraph 10.5.1.

(b) Chemical or Petroleum Pressure Vessels. No person, corporation or firm shall connect any pressure vessel, i.e., storage tank, tank car, tank truck or trailer or other miscellaneous pressurized tank or cylinder containing or having contained liquefied gaseous petroleum products or other liquefied gaseous chemicals to any public water supply. Water for flushing or cooling, or otherwise to be instilled into such a vessel shall be obtained by gravity through a minimum air gap as outlined in paragraph

10.5.1, sub-pragraph (a-c). If water under pressure is required, it may be supplied only by means of an auxiliary pump taking suction from a suction tank provided with an over-rim supply having the required minimum air gap as outlined in paragraph 10.5.1, sub-paragraph (a-c).

(c) Refrigerant Condensers. No refrigerant condenser of the water jacket type employing a common wall between the refrigerant gas and the cooling water shall be directly connected to a public water supply. Cooling water, if from a public water supply shall be obtained by gravity through a minimum air gap, or by use of an auxiliary pump and tank as outlined in paragraph 10.4.4, sub-paragraph (b).

(d) Chemical pressure vessels containing chemicals used in the water treatment process by the authority charged with the operation of the water supply are hereby specifically exempted from the provisions of paragraph 10.4.4, sub-paragraphs (a) and (b).

10.5 VACUUM BREAKERS AND AIR GAPS

10.5.1 Air Gaps. Air gaps should be used whenever possible, in preference to backflow preventers (vacuum breakers) and should be used on such installations as cooling towers, air-conditioning plenum chambers, open tanks, etc., in accordance with the following requirements:

(a) The air gap in a water-supply system is the unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet supplying water to a tank or plumbing fixture and the floodlevel rim of the receptacle. (See Fig. 1 and Fig. 2.)

(b) The minimum required air gap shall be measured vertically from the end of the faucet spout or supply pipe to the floodlevel rim of the fixture or vessel. (See Fig. 1 and Fig. 2.)

(c) The minimum required air gap shall be twice the diameter of the effective opening, but in no case less than given in Table 10.5.

(d) Where it is not practical to provide a minimum required air gap above the floodlevel rim of a tank or vat, a backflow preventer shall be installed in accordance with paragraph 10.4.3.

10.5.2 Vacuum Breakers or Backflow Preventers

(a) Required. Backflow preventers shall be installed with any supply fiixture, the outlet end of which may at times be sub-

merged, such as hose and spray, direct flushing valves, aspirators and underrim water supply connections to a plumbing fixture or receptacle in which the surface of the water in the fixture or receptacle is exposed at all times to atmospheric pressure. The type of preventer referred to will not protect against backflow when water is discharged through it into a space which contains pressure higher than atmospheric.

(b) Where. Backflow preventers shall be installed between the control valve and the fixture and in such a manner that it will not be subjected to water pressure, except the back pressure incidental to water flowing to the fixture.

(c) Backflow preventers shall be installed on the outlet side of the control valve.

(d) Backflow preventers shall be made of corrosion-resistant material and shall be so designed and proportioned as to prevent deterioration or deformation under reasonable service conditions.

(e) Backflow preventers shall have been tested and approved to meet tests and performances as required for Backflow Preventers by ASA A40.6-1943.

10.5.3 Flushometer. Flushometer valves shall be equipped with approved vacuum breakers. The vacuum breaker shall be installed on the discharge side of the flushing valve with the critical level at least 4 inches above the overflow rim of the bowl.

10.5.4 Flushing Tanks. Flushing tanks shall be equipped with approved anti-siphon ball-cocks. The ball-cock shall be installed with the critical level of the vacuum breaker at least 1 inch above the full opening of the overflow pipe. In cases where the ball-cock has no hush tube, the bottom of the water supply inlet shall be installed 1 inch above the full opening of the overflow pipe.

10.5.5 Trough Urinals. Trough urinals shall be equipped with approved vacuum breakers installed on the discharge side of the last valve and not less than 12 inches above the spray pipe.

Table 10.5 MINIMUM AIR GAPS FOR GENERALLY USED PLUMBING FIXTURES

Fixture	Minimum Air Gap	
	When not Affected by Near Wall[1]	When Affected by Near Wall[2]
Lavatories with effective openings not greater than ½ in. diameter	1.0	1.50
Sink, laundry trays, and goose neck bath faucets with effective openings not greater than ¼ in. diameter	1.5	2.25
Overrim bath fillers with effective openings not greater than 1 in. diameter	2.0	3.00
Effective openings greater than 1 in.	(3)	(4)

[1] Side walls, ribs, or similar obstructions do not affect the air gaps when spaced from inside edge of spout opening a distance greater than three times the diameter of the effective opening for a single wall, or a distance greater than four times the diameter of the effective opening for two intersecting walls. (See Fig. 2.)

[2] Vertical walls, ribs, or similar obstructions extending from the water surface to or above the horizontal plane of the spout opening require a greater air gap when spaced closer to the nearest inside edge of spout opening than specified in note 1 above. The effect of three or more such vertical walls or ribs has not been determined. In such cases, the air gap shall be measured from the top of the wall.

[3] 2 x effective opening.

[4] 3 x effectve opening.

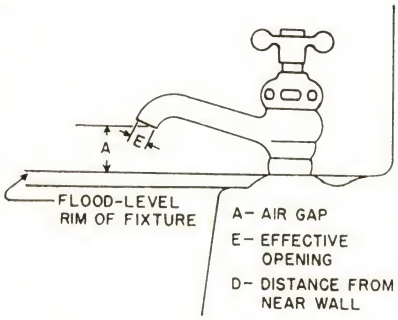


Fig. 1. AIR GAP AND EFFECTIVE OPENING

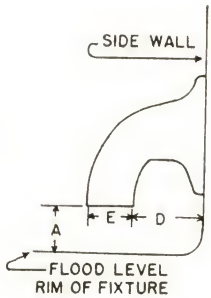


Fig. 2. NEAR-WALL INFLUENCE ON AIR GAP

10.5.6 Lawn Sprinklers. Lawn sprinkler systems shall be equipped with approved vacuum breakers on the discharge side of each of the last valves. The vacuum breaker shall be at least 6 inches above the highest head, and in no case less than 6 inches above the surrounding ground. Where combination control valves and vacuum breakers are installed, the bottom of the valve shall constitute the bottom of the vacuum breaker.

10.5.7 Valve Outlet. Fixtures with hose attachments shall be protected by an approved vacuum breaker installed six inches above the highest point of usage and on the discharge side of the valve.

10.5.8 Commercial Laundry Machines. Commercial laundry machines shall be equipped with approved vacuum breakers located on the discharge side of the water control valves, a minimum distance of 26 inches above the top of the machine.

10.5.9 Commercial Dishwashers. Commercial dishwashers shall be equipped with approved vacuum breakers located in the rinse water supply line on the discharge side of the final control valve, a minimum distance of 6 inches above the uppermost spray outlets. The cold water or make-up water supply line shall be provided with an air gap as outlined in paragraph 10.5.1, or an approved vacuum breaker located on the discharge side of the final control valve, a minimum distance of 6 inches above the absolute overflow or flood rim.

10.5.10 Aspirators. Water operated aspirators shall meet the following specifications: (A) The water supply line shall be equipped with a shut-off and a check valve. (B) An approved vacuum breaker shall be installed on the discharge side of the control valve and shall be located at least 6 inches above the highest point from which the aspirator may take suction. (C) The aspirator water discharge shall be provided with a 2 inch air gap to the receiving fixture.

10.5.11 Pressure-Type Water Treatment Units. Wash-water and rinse-water drain lines from water softeners and other types of water treatment filters shall discharge to a sump through an air gap equal to at least two times the nominal diameter of the discharge pipe.

10.6 WATER SERVICE PIPE

10.6.1 The underground water-service pipe and the building drain shall be not less than 10 feet apart horizontally and shall be separated by undisturbed or compacted earth.

10.6.2 Exception. The water-service pipe may be placed in the same trench with the building drain provided that the following conditions are met:

The bottom of the water-service pipe, at all points, shall be at least 18 inches above the top of the drain line at its highest point.

The water-service pipe shall be placed on a solid shelf excavated at one side of the common trench.

The number of joints in the service pipe shall be kept to a minimum.

The materials and joints of drain and water-service pipe shall be installed in such manner and shall possess the necessary strength and durability to prevent the escape of solids, liquids, and gases, therefrom, under all known adverse conditions such as corrosion, strains due to temperature changes, settlement, vibrations and superimposed loads. The water-service pipe shall be in accordance with paragraph 10.10.1 and the drain pipe shall be in accordance with paragraph 11.2.2.

10.6.3 Stop-and-Waste Valve Combination. Combination stop-and-waste valves and cocks shall not be installed in an underground service pipe, except by approval of the Administrative Authority. In no case shall a stop-and-waste valve be located closer than 10 feet to a sewer or drain line. Whenever possible, stop-and-waste valves shall be replaced with shut-off and drip valves as provided in paragraph 10.12.1.

10.6.4 Private Water Supply. No private water supply shall be interconnected with any public water supply without the specific approval of the Illinois Department of Public Health.

10.7 WATER PUMPING AND STORAGE EQUIPMENT

10.7.1 Pumps and Other Appliances. Water pumps, tanks, filters, and all other appliances and devices shall be protected against contamination.

10.7.2 Water-Supply Tanks. Potable-water-supply tanks shall be properly covered to prevent the entrance of foreign material or insects into the water supply. Soil or waste lines shall not pass directly over such tanks.

10.7.3 **Pressure Tanks, Boilers, and Relief Valves.** The drains from pressure tanks, boilers, relief valves and similar equipment shall be connected to the drainage system through an indirect waste.

10.7.4 **Cleaning, Painting, Repairing Water Tanks.** A potable-water-supply tank used for domestic purposes shall not be lined, painted, or repaired with any material which will affect either the taste or the potability of the water supply when the tank is returned to service. Tanks shall be disconnected from the system during such operations, to prevent any foreign fluid or substance from entering the distribution piping.

10.8 WATER-SUPPLY TANKS AND AUXILIARY PRESSURE SYSTEMS

10.8.1 **When Required.** When the water pressure from the public water supply main is insufficient during periods of peak flow, or due to the building height, to supply all fixtures adequately and continuously, the rate of supply shall be supplemented by gravity house tank or auxiliary pressure (booster) system. See paragraphs 10.14.5 and 10.14.6 for pump control requirements. Auxiliary pressure systems shall not be utilized as an alternate for adequate sizing of water distribution piping within the building.

10.8.2 **Support.** All water-supply tanks shall be supported in accordance with the building code or other regulations which apply.

10.8.3 **Overflow for Water-Supply Tanks.** Overflow pipes for gravity tanks shall discharge above and within 6 inches of a roof or catch basin, or they shall discharge over an open, water-supplied sink. Adequate overflow pipes properly screened against the entrance of insects and vermin shall be provided.

10.8.4 **Tank Supply.** The water-supply inlet within the tank shall be at an elevation not less than is required for an air gap in an open tank with overflow, but in no case shall the elevation be less than 4 inches above the overflow. (See Appendix A).

10.8.5 **Drains.** Water-supply tanks shall be provided with valved drain lines located at their lowest point and discharged as an indirect waste or as required for overflow pipes in paragraph 10.4.3.

10.8.6 Size of Overflow. Overflow drains for water supply tanks shall not be less than the following:

Drain Pipe (Inches)	Tank Capacity (Gallons)	Drain Pipe (Inches)	Tank Capacity (Gallons)
1	Up to 750	2½	3,001 to 5,000
1½	751 to 1,500	3	5,001 to 7,500
2	1,501 to 3,000	4	Over 7,500

10.8.7 Gravity and Suction Tanks. Tanks used for domestic water supply, combined supply to fire standpipes and domestic water system, or to supply standpipes for fire-fighting equipment only, shall be equipped with tight covers which are vermin and rodent proof. Such tanks shall be vented with a return bend vent pipe having an area not less than one-half the area of the down feed riser and the vent opening shall be covered with a metallic screen of not less than twenty-four (24) mesh per inch.

10.8.8 Pressure Tanks. Pressure tanks used for supplying water to the domestic water distribution system, combined supply to fire standpipes and domestic water system, or to supply standpipes for fire equipment only, shall be equipped with an acceptable vacuum breaking device located on the top of the tank. The air inlet of this device shall be covered with a metallic screen of not less than twenty-four (24) mesh per inch.

10.9 DISINFECTION OF POTABLE WATER SYSTEM PIPING

10.9.1 Potable water systems or any part thereof installed or repaired shall be disinfected in accordance with one of the following methods before it is placed in operation.

10.9.2 The system, or part thereof, shall be filled with a solution containing 50 parts per million of available chlorine and allowed to stand 6 hours before flushing and returning to service.

10.9.3 The system, or part thereof, shall be filled with a solution containing 100 parts per million of available chlorine and allowed to stand 2 hours before flushing and returning to service.

10.9.4 In the case of a potable-water storage tank where it is not possible to disinfect as provided in paragraphs 10.9.2 and 10.9.3 the entire interior of the tank shall be swabbed with a solution containing 200 parts per million of available chlorine and the solution allowed to stand 2 hours before flushing and returning to service.

10.9.5 **In the case of potable-water filters** or similar devices, the dosage shall be determined by the Administrative Authority, or other authority having jurisdiction.

10.10 WATER-DISTRIBUTION PIPE, TUBING AND FITTINGS

10.10.1 **Materials for water-distributing pipes** and tubing shall be brass, copper (Type K or L), lead, cast iron, wrought iron, steel, asbestos cement or plastic (See Sec. 3.3) with appropriate approved fittings. All threaded ferrous pipe and fittings shall be galvanized (zinc-coated) or cement lined. When used underground in corrosive soil, all ferrous pipe and fittings shall be coal-tar enamel coated and the threaded joints shall be coated and wrapped after installation. (See Chapter 3 for Standards.)

10.10.2 **Cement Joints.** Cement joints shall not be used in the water distribution system.

10.11 ALLOWANCE FOR CHARACTER OF WATER

10.11.1 **Selection of Materials.** When selecting the material and size for water-supply pipe, tubing, or fittings, due consideration shall be given to the action of the water on the interior and of the soil, fill or other material on the exterior of the pipe. No material that would produce toxic conditions in a potable-water supply system shall be used for piping, tubing, or fittings.

10.11.2 **Used Piping.** No piping material that has been used for other than a potable water-supply system shall be reused in the potable water-supply system.

10.12 WATER SUPPLY CONTROL

10.12.1 **Water Supply Control.** A main shut-off valve on the water-service pipe shall be provided near the curb and, also, an accessible shut-off valve with a drip valve shall be provided inside near the entrance of the water-service pipe into the building.

10.12.2 **Tank Controls.** Supply lines taken from pressure or gravity tanks shall be valved at or near their source.

10.12.3 **Separate Controls for Each Family Unit.** In two-family or multiple dwellings, each family unit shall be controlled by an arrangement of shut-off valves which permit each group of fixtures or the individual fixtures to be shut off without inter-

ference with the water supply to any other family unit or portion of the building.

10.12.4 Group of Fixtures. A group of fixtures means two or more fixtures adjacent or near each other. In a one-family house one or two bathrooms adjacent or one over the other may be considered a group.

10.12.5 Buildings Other Than Dwellings. In all buildings other than dwellings shut-off valves shall be installed, which permit the water supply to all equipment in each separate room to be shut off without interference with the water supply to any other room or portion of the building.

10.12.6 Water Heating Equipment. A shut-off valve shall be provided in the cold water branch line to each water-storage tank or each water heater.

10.12.7 Shut-Off Valve at Meter. The shut-off valve at the discharge side of the water meter shall be not less in size than the size of the building water service, and shall be of the gate-type with suitable drainage provisions.

10.13 WATER SUPPLY DISTRIBUTION

10.13.1 Water-Service Pipe. The water-service pipe from the street main to the water-distribution system for the building shall be of sufficient size to furnish an adequate flow of water to meet the requirements of the building at peak demand, and in no case shall be less than ¾ inch nominal diameter.

If flushometers or other devices requiring a high rate of water flow are used, the water-service pipe shall be designed to supply this flow.

10.13.2 Demand Load. The demand load in the building water-supply system shall be based on the number and kind of fixtures installed and the probable simultaneous use of these fixtures.

10.14 PROCEDURE IN SIZING THE WATER DISTRIBUTION SYSTEM OF A BUILDING

10.14.1 The sizing of the water distribution system shall conform to good engineering practice. Methods used to determine pipe sizes shall be acceptable to the Administrative Authority. (See Appendix A for guidance in the design of water-supply systems.)

10.14.2 **Size of Fixture-Supply.** The minimum size of a fixture-supply pipe shall be as follows:

Type of Fixture or Device	Pipe Size (inches)	Type of Fixture or Device	Pipe Size (inches)
Bath tubs	½	Shower (single head)	½
Combination sink and tray	½	Sinks (service, slop)	½
Drinking fountain	⅜	Sinks flushing rim	¾
Dishwasher (domestic)	½	Urinal (flush tank)	½
Kitchen sink, residential	½	Urinal (direct flush valve)	¾
Kitchen sink, commercial	¾	Water closet (tank type)	⅜
Lavatory	⅜	Water closet (flush valve type)	1
Laundry tray, 1, 2 or 3 compartments	½	Hose bibbs	½
		Wall hydrant	½

For fixtures not listed, the minimum supply branch may be made the same as for a comparable fixture.

10.14.3 **Minimum Pressure.** Minimum, fairly constant, service pressure, at the point of outlet discharge shall be not less than 8 psi for all fixtures except for direct flush-valves, for which it shall be not less than 15 psi, and except where special equipment is used requiring higher pressure. In determining the minimum pressure, allowance shall be made for the pressure drop due to friction loss in the piping system during maximum demand periods as well as head, meter, and other losses in the system.

10.14.4 **Auxiliary Pressure. Supplementary Tank.** If the residual pressure in the system is below the minimum allowable at the highest water outlet when the flow in the system is at peak demand, an automatically controlled pressure tank or gravity tank shall be installed, of sufficient capacity to supply sections of the building installation which are too high to be supplied directly from the public water main.

10.14.5 **Low Pressure Cut-Off.** When a booster pump is used on an auxiliary pressure system there shall be installed a low-pressure cut-off switch on the booster pump to prevent the creation of pressures less than 5 psi on the suction side of the pump. A shut-off valve shall be installed on the suction side of the water system, and within 5 feet from the pump suction inlet, and a pressure gage shall be installed between the shut-off valve and pump.

As an alternate arrangement, a pump suction tank may be provided for the auxiliary pressure system. Water shall be supplied to the suction tank through a float controlled over-rim supply having a minimum air gap equal to two diameters of the supply opening.

10.14.6 Approval of Auxiliary Pressure Systems. Whenever in any building, structure, or premises receiving its water supply directly from the public water system, a pump or any other device for increasing the water pressure is to be installed, plans of such installation shall first be submitted to the Administrative Authority for approval.

10.14.7 Variable Street Pressures. When the street main has a wide fluctuation in pressure during the day, the water distribution system shall be designed for minimum pressure available.

10.14.8 Hazard and Noise. Where water pressures are excessive, air chambers or other approved mechanical devices shall be provided to reduce water hammer or line noises to such an extent that no pressure hazard to the piping system will exist.

10.15 HOT-WATER SUPPLY AND DISTRIBUTION

10.15.1 Hot-Water Heaters. Hot-Water heaters shall conform to ASA Standards No. C72.1-1949, Z21.10.1-1956 and Z21.10.2-1956.

10.15.2 Hot-Water Distribution Piping. The sizing of the hot-water distribution piping shall conform to good engineering practices (See Paragraph 10.14.1).

10.16 SAFETY DEVICES

10.16.1 Pressure-Relief Valve. Reseating-type pressure-relief valves shall be installed for all equipment used for heating or storage of hot water. The rate of discharge of such a valve shall limit the pressure rise for any given heat input to 10 percent of the pressure at which the valve is set to open.

10.16.2 Temperature Relief Valves or Energy Shut-off Devices. Reseating-type temperature relief valves or energy shut-off devices shall be installed for equipment used for the heating or storage of hot water. Each temperature relief valve shall be rated as to its BTU capacity. At 210 deg. F., it shall be capable of discharging sufficient hot water to prevent any further rise in temperature. As an alternative to the temperature relief valve, and in lieu thereof, an energy shut-off device may be used, which will cut off the supply of heat energy to the water tank before the temperature of the water in the tank exceeds 210 deg. F.

10.16.3 **Approvals.** Combination pressure and temperature relief valves, separate pressure and temperature relief valves, or energy shut-off devices, which have been tested and approved by, or meet the specification requirements of, the American Gas Association, the Underwriters' Laboratories, Inc., or other recognized approval authorities, shall be considered acceptable.

10.16.4 **Relief-Valve Location.** Temperature-relief valves shall be so located in the tank as to be actuated by the water in the top one-eighth of the tank served and in no case more than 3 inches away from such tank. Pressure-relief valves may be located adjacent to the equipment they serve. There shall be no check valve or shut-off valve between a relief valve and the heater or tank for which it is installed.

10.16.5 **Relief Outlet Wastes.** The outlet of a pressure, temperature, or other relief valve shall not be connected to the drainage system as a direct waste.

10.16.6 **Pressure Marking of Storage Tank.** Any storage tank hereafter installed for domestic hot water shall have clearly and indelibly stamped in the metal, or so marked upon a plate welded thereto, or otherwise permanently attached, the maximum allowable working pressure. Such markings shall be in an accessible position outside of the tank so as to make inspection or reinspection readily possible. All storage tanks for domestic hot water shall meet the applicable ASA standards.

10.17 MISCELLANEOUS

10.17.1 **Drain Cock.** All storage tanks shall be equipped with adequate drain cocks.

10.17.2 **Line Valves.** Valves in the water-supply distribution system, except those immediately controlling one fixture supply, when fully opened shall have a cross-sectional area of the smallest orifice or opening through which the water flows at least equal to the cross-sectional area of the nominal size of the pipe in which the valve is installed.

10.17.3 **Water Used for Processing.** Water used for cooling of equipment or similar purposes shall not be returned to the potable-water distributing system. When discharged to the building drainage system, the waste water shall be discharged through an indirect waste pipe or air gap.

CHAPTER 11

DRAINAGE SYSTEM

11.1 MATERIALS

11.1.1 General. Pipe, tubing, and fittings for drainage systems shall comply with the provisions in Chapter 3.

11.1.2 Above-Ground Piping Within Buildings. Soil and waste piping for a drainage system within a building shall be of cast-iron, galvanized wrought iron, lead, brass, copper (DWV or heavier) or rigid plastic (See Section 3.5).

11.1.3 Underground Piping Within Buildings. All drains within buildings, when underground, shall be of extra-heavy cast iron soil or water pipe, to a distance beyond the footings or bearing walls to undisturbed earth, and in no case less than 5 feet.

11.1.4 Exception. In certain cases where extra corrosive waste is to be carried or where soil conditions make it necessary, piping of other special materials may be used within limits defined in other portions of this Code.

11.1.5 Fittings. Fittings on the drainage system shall conform to the type of piping used. Fittings on screwed pipe shall be of the recessed drainage type. (See Section 2.4)

11.2 BUILDING DRAIN

11.2.1 Separate Trenches. The building drain shall be installed in a separate trench from the water-service pipe, the pipes being separated horizontally by not less than 10 feet of undisturbed or compacted earth, except as outlined in paragraph 10.6.2. The building drain from a point 5 feet outside the building wall or otherwise, as specified in paragraph 11.1.3, shall be of cast iron pipe, copper pipe (Type L), rigid plastic pipe (See paragraph 3.5), vitrified clay sewer pipe, concrete sewer pipe, asbestos-cement sewer pipe, or bituminized fiber pipe. Joints shall be rootproof and watertight when tested with a 10 foot head of water or equivalent.

11.2.2 Exception.
(a) When the building drain and water service pipe are placed with less than the above separation, or in the same trench

as specified in paragraph 10.6.2, the water service pipe shall be placed as indicated in paragraph 10.6.2, and the building drain shall be constructed of cast iron with leaded or screwed joints, type K hard-temper copper pipe with sweated joints, or rigid plastic pipe as specified in Section 3.5. The drain shall be tested with a 10 foot head of water or equivalent and found to be tight.

(b) In certain cases where wastes of exceptional character, such as unusually corrosive, are to be carried, or where soil conditions make it necessary, piping of other special materials may be used within limits defined in other portions of this Code.

11.2.3 **Drain in Filled Ground.** A building drain installed in filled or unstable ground shall be of cast-iron pipe, except that nonmetallic drains may be laid upon an approved concrete pad if installed in accordance with paragraph 11.2.1.

11.2.4 **Sanitary and Storm Drains.** Where separate systems of sanitary drainage and storm drainage are installed in the same property, the sanitary and storm building drains may be laid side by side in one trench.

11.2.5 **Old House Drains.** Old house drains may be used in connection with new building or new plumbing and drainage work only when they are found, on examination and test, to conform in all respects to the requirements governing new house drains, and the Administrative Authority shall notify the owner to make the changes necessary to conform to this Code.

11.2.6 **Protection of Pipes.** Trench bottoms shall be hand-trimmed to grade with provision for bedding of the pipe throughout its entire length. Adequate excavations shall be made to accommodate the bells or couplings to prevent unnecessary stress in the pipe. Joints shall be made waterproof and rootproof and shall be made in accordance with the requirements contained in Chapter 4. Trenches shall be backfilled and compacted to a distance of at least 18 inches above the top of the pipe with hand tools prior to the use of mechanical equipment for backfilling.

11.3 DRAINAGE PIPING INSTALLATION

11.3.1 **Horizontal Drainage Piping.** Horizontal drainage piping shall be installed at a uniform slope but at slopes not less than permitted in paragraphs 11.3.2, 11.3.3, and 11.3.4.

11.3.2 **Small Piping.** Horizontal drainage piping of 3-inch diameter and less shall be installed with a fall of not less than ¼ inch per foot.

11.3.3 **Large Piping.** Horizontal drainage piping larger than 3-inch diameter shall be installed with a fall of not less than ⅛ inch per foot.

11.3.4 **Minimum Velocity.** Where conditions do not permit building drains to be laid with a fall as great as that specified, then a lesser slope may be permitted provided the computed velocity will not be less than 2 feet per second.

11.3.5 **Cleanouts.** See Chapter 5.

11.4 FIXTURE UNITS

11.4.1 **Values for Fixtures.** Fixture-unit values as given in Table 11.4.2 designate the relative load weight of different kinds of fixtures which shall be employed in estimating the total load carried by a soil waste pipe and shall be used in connection with the tables of sizes for soil, waste, and drain pipes for which the permissible load is given in terms of fixture units.

Table 11.4.2 FIXTURE UNITS PER FIXTURE OR GROUP

Fixture Type	Fixture-Unit Value as Load Factors	Minimum Size of Trap[2] Inches	
1 bathroom group consisting of water closet, lavatory and bathtub or shower stall	Tank water closet 6 Flush-valve water closet 8		
Bathtub[1] (with or without overhead shower)	2		1½
Bathtub[1]	3		2
Bidet	3	Nominal	1½
Combination sink-and-tray	3		1½
Combination sink-and-tray with food-disposal unit	4	Separate traps	1½
Dental unit or cuspidor	1		1¼
Dental lavatory	1		1¼
Drinking fountain	½		1
Dishwasher[2] domestic	2		1½
Floor drains[3]	1		2
Kitchen sink, domestic	2		1½
Kitchen sink, domestic, with food waste grinder	3		1½
Lavatory[4]	1	Small P.O.	1¼
Lavatory[4]	2	Large P.O.	1½

Table 11.4.2 FIXTURE UNITS PER FIXTURE OR GROUP (Continued).

Fixture Type	Fixture-Unit Value as Load Factors	Minimum Size of Trap[2] Inches
Lavatory, barber, beauty parlor	2	1¼
Lavatory, surgeon's	2	1½
Laundry tray (1 or 2 compartments)	2	1½
Shower stall, domestic	2	2
Showers (group) per head[4]	3	...
Sinks:		
Surgeon's	3	1½
Flushing rim (with valve)	8	3
Service (Trap standard)	3	3
Service (P trap)	2	2
Pot, scullery, etc.[2]	4	1½
Urinal, pedestal, syphon jet, blowout	8	Nominal 3
Urinal, wall lip	4	1½
Urinal stall, washout	4	2
Urinal trough[2] (each 2-ft. section)	2	1½
Wash sink[2] (circular or multiple) each set of faucets	2	Nominal 1½
Water closet, tank-operated	4	Nominal 3
Water closet, valve-operated	8	3

[1] A shower head over a bathtub does not increase the fixture value.
[2] See Pars. 11.4.3 and 11.4.4 for method of computing unit value of fixtures not listed in Table 11.4.2 or for rating of devices with intermittent flows.
[3] Size of floor drain shall be determined by the area of surface water to be drained.
[4] Lavatories with 1¼ or 1½ inch trap have the same load value; larger P.O. plugs have greater flow rate.

11.4.3 **Fixtures not listed in Table** 11.4.2 shall be estimated in accordance with Table 11.4.3.

Table 11.4.3

Fixture drain or trap size	Fixture-unit value
1¼ inches and smaller	1
1½ inches	2
2 inches	3
2½ inches	4
3 inches	5
4 inches	6

11.4.4 Values for Continuous Flow. For a continuous or semicontinuous flow into a drainage system, such as from a pump, pump ejector, air-conditioning equipment, or similar device, two fixture units shall be allowed for each gallon-per-minute of flow.

11.5 DETERMINATION OF SIZES FOR THE DRAINAGE SYSTEM

11.5.1 Maximum Fixture-Unit Load. The maximum number of fixture units that may be connected to a given size of building drain, horizontal branch, or vertical soil or waste stack is given in Tables 11.5.3 and 11.5.4.

11.5.2 Minimum Size of Building Drain, Horizontal Branch, or Vertical Soil Stack. The minimum allowable size of any building drain, horizontal branch, or vertical soil or waste stack serving one or more water closets shall be three (3) inches.

Table 11.5.3 BUILDING DRAINS

Diameter of Pipe (inches)	Maximum Number of Fixture Units That May Be Connected to Any Portion[1] of the Building Drain			
	Fall per Foot			
	1/16 Inch	1/8 Inch	1/4 Inch	1/2 Inch
2	.....	.....	21	26
2½	.....	.....	24	31
3	.....	20[2]	27[2]	36[2]
4	.....	180	216	250
5	.....	390	480	575
6	.....	700	840	1,000
8	1,400	1,600	1,920	2,300
10	2,500	2,900	3,500	4,200
12	3,900	4,600	5,600	6,700
15	7,000	8,300	10,000	12,000

[1] Includes branches of the building drain.
[2] Not over two water closets.

Table 11.5.4 HORIZONTAL FIXTURE BRANCHES AND STACKS

Diameter of Pipe (inches)	Maximum Number of Fixture Units That May Be Connected to:			
	Any Horizontal[1] Fixture Branch	One Stack of 3 Stories in Height or 3 Intervals	More than 3 Stories in Height	
			Total for Stack	Total at One Story or Branch Interval
1¼	1	2	2	1
1½	3	4	8	2
2	6	10	24	6
2½	12	20	42	9
3	20[2]	30[3]	60[3]	16[2]
4	160	240	500	90
5	360	540	1,100	200
6	620	960	1,900	350
8	1,400	2,200	3,600	600
10	2,500	3,800	5,600	1,000
12	3,900	6,000	8,400	1,500
15	7,000	.....	.....	.....

[1] Does not include branches of the building drain.
[2] Not over two water closets.
[3] Not over six water closets.

11.5.5 **Minimum Size of Soil and Waste Stacks.** No soil or waste stack shall be smaller than the largest horizontal branch connected thereto except that a 4 x 3 W.C. connection shall not be considered as a reduction in pipe size.

11.5.6 **Minimum Size of Stack-Vent or Vent Stack.** Any structure on which a building drain is installed shall have at least one stack-vent or vent stack carried full size through the roof not less than 3 inches in diameter or the size of the building drain, whichever is the greater.

11.5.7 **Future Fixtures.** When provision is made for the future installation of fixtures, those provided for shall be considered in determining the required sizes of drain pipes. Construction to provide for such future installation shall be terminated with a plugged fitting or fittings at the stack so as to form no dead end.

11.5.8 Underground Drainage Piping. No portion of the drainage system installed underground or below a basement or cellar shall be less than 2 inches in diameter.

11.6 OFFSETS ON DRAINAGE PIPING

11.6.1 Offsets of 45 Deg. or Less. An offset in a vertical stack, with a change of direction of 45 deg. or less from the vertical, may be sized as a straight vertical stack. In case a horizontal branch connects to the stack within 2 feet above or below the offset, a relief vent shall be installed in accordance with paragraph 12.18.3.

11.6.2 Waste Stacks Serving Kitchen Sinks. In a one- or two-family dwelling only in which the waste stack or vent receives the discharge of a kitchen-type sink and also serves as a vent for fixtures connected to the horizontal portion of the branch served by the waste stack, the minimum size of the waste stack up to the highest sink branch connection shall be 2 inches in diameter. Above that point the size of the stack shall be governed by the total number of fixture units vented by the stack.

11.6.3 Above Highest Branch. An offset above the highest horizontal branch is an offset in the stack-vent and shall be considered only as it affects the developed length of the vent.

11.6.4 Below Lowest Branch. In the case of an offset in a soil or waste stack below the lowest horizontal branch, no change in diameter of the stack because of the offset shall be required if it is made at an angle of not greater than 45 deg. If such an offset is made at an angle greater than 45 deg., the required diameter of the offset and the stack below it shall be determined as for a building drain (Table 11.5.3).

11.6.5 Offsets of More than 45 Deg. A stack with an offset of more than 45 deg. from the vertical shall be sized as follows:

The portion of the stack above the offset shall be sized as for a regular stack based on the total number of fixture units above the offset.

The offset shall be sized as for a building drain. (Table 11.5.3, Column 5).

The portion of the stack below the offset shall be sized as for the offset or based on the total number of fixture units on the entire stack, whichever is the larger. (See Table 11.5.4, Column 4.)

A relief vent for the offset shall be installed as provided in Chapter 12 and in no case shall the horizontal branch connect to the stack within 2 feet above or below the offset.

11.7 SUMPS AND EJECTORS

11.7.1 **Building Drains Below Sewer.** Building drains which cannot be discharged by gravity flow shall be discharged into a gas-tight covered and vented sump from which the liquid shall be lifted and discharged into the building gravity drainage system by automatic pumping equipment.

11.7.2 **Design.** Sump and pumping equipment shall be so designed as to discharge all contents accumulated in the sump during the cycle of emptying operation.

11.7.3 **Venting.** The system of drainage piping below the building drain level shall be installed and vented, in a manner similar to that of the gravity system.

11.7.4 **Duplex Equipment.** Sumps receiving the discharge of more than six water closets shall be provided with duplex pumping equipment.

11.7.5 **Vent Sizes.** Building sump vents shall be sized in accordance with table 12.21.5 but shall in no case be sized less than 1½ inches.

11.7.6 **Separate Vents.** Vents from pneumatic ejectors or similar equipment shall be carried separately to the open air as a vent terminal.

11.7.7 **Connections.** No direct connection of a steam exhaust, blowoff, or drip pipe shall be made with the building drainage system. Waste water when discharged into the building drainage system shall be at a temperature not higher than 180 deg. F. When higher temperature exists, proper cooling methods shall be provided.

11.8 FLOOR DRAINS

11.8.1 **Accessibility.** Floor Drains shall connect into a trap so constructed that it can be readily cleaned and of a size to serve efficiently the purpose for which it is intended. The drain inlet shall be so located that it is, at all times, in full view.

11.8.2 Provision for Evaporation. Floor-drain trap seals subject to evaporation shall be of the deep-seal type or shall be fed from an approved plumbing fixture or by means of an approved automatic priming device designed and approved for that purpose.

11.8.3 Size. Floor-drain traps and drains, installed below a basement floor or underground, shall be not less than 2 inches in diameter.

11.8.4 Bell Traps. Bell traps are prohibited.

11.9 FROST PROTECTION

11.9.1 No soil or waste pipes shall be installed or permitted outside of a building, or concealed in outside walls or in any place where they may be subjected to freezing temperatures, unless adequate provision is made to protect them from frost.

CHAPTER 12

VENTS AND VENTING

12.1 MATERIALS

12.1.1 Vents. Pipe, tubing, and fittings for the vent piping system shall comply with the provisions in Chapter 3.

12.1.2 Specific Type. Standards given in Table 3.8 apply to the specific materials approved for use and as indicated in the various paragraphs in this chapter as they apply to the venting system.

12.1.3 Piping. Vent piping shall be of cast iron, galvanized wrought iron, galvanized steel, and ferrous alloys, lead, brass, copper (DWV or heavier), or rigid plastic. (See Sec. 3.4).

12.1.4 Underground. Vent piping placed underground shall be extra-heavy cast-iron pipe. Where threaded joints are used underground, they shall be coated and wrapped after installation and test.

12.1.5 Fittings. Fittings shall conform to the type of pipe used in the vent system as required by paragraphs 12.1.2 and 12.1.3.

12.1.6 Acid System. Vent piping on acid-waste systems shall conform to that required for acid -waste pipe, except as may be found adequate by the Administrative Authority.

12.1.7 Other Materials. Nothing in this section shall be deemed to preclude the use of other materials of equal or better quality when approved as such by the Administrative Authority.

12.2 PROTECTION OF TRAP SEALS

12.2.1 Traps Protected. The protection of trap seals from siphonage or back pressure shall be accomplished by the appropriate use of soil or waste stacks, vents, revents, back vents, circuit or continuous vents, or combinations thereof, installed in accordance with the requirements of this chapter.

12.3 VENT STACKS

12.3.1 Installation. A vent stack or a main vent shall be installed with a soil or waste stack whenever back vents, relief vents, or other branch vents are required in two or more branch intervals.

12.3.2 Terminal. The vent stack shall terminate independently above the roof of the building or shall be connected with the extension of the soil or waste stack (stack-vent) at least 6 inches above the flood-level rim of the highest fixture.

12.3.3 Main Stack. Every building in which plumbing is installed shall have at least one main stack, which shall run undiminished in size and as directly as possible, from the building drain through to the open air above the roof.

12.4 VENT TERMINALS

12.4.1 Roof Extension. Extensions of vent pipes through a roof shall be terminated at least 6 inches above it.

12.4.2 Roof Garden. Where a roof is to be used for any purpose other than weather protection, the vent extensions shall be run at least 5 feet above the roof.

12.4.3 Flashings. Each vent terminal shall be made watertight with the roof by proper flashing.

12.4.4 Flag Poling. Vent terminals shall not be used for the purpose of flag poling, TV aerials, or similar purposes.

12.4.5 Location of Vent Terminal. No vent terminal from a drainage system shall be directly beneath any door, window, or other ventilating opening of the building or of an adjacent building nor shall any such vent terminal be within 10 feet horizontally of such an opening unless it is at least 2 feet above the top of such opening.

12.4.6 Extensions Outside Building. No soil, waste, or vent pipe extension shall be run or placed on the outside of a wall of any building, but shall be carried up inside the building.

12.5 FROST CLOSURE

12.5.1 Vent Terminals. The vent extension through the roof shall in no instance be smaller than the vent which it terminates,

and shall be increased to prevent closure by frost when so required by the Administrative Authority. Vent terminals shall not be screened.

12.5.2 **Increasers.** Change in diameter of vent terminals when required shall be made by use of a long increaser at least 1 foot below the roof.

12.6 VENT GRADES AND CONNECTIONS

12.6.1 **Grade.** All vent and branch-vent pipes shall be so graded and connected as to drip back to the soil or waste pipe by gravity.

12.6.2 **Vertical Rise.** Where vent pipes connect to a horizontal soil or waste pipe, the vent shall be taken off above the center line of the soil pipe, and the vent pipe shall rise vertically, or at an angle not more than 45 deg. from the vertical, from the fixture it is venting before offsetting horizontally or before connecting to the branch vent.

12.6.3 **Height Above Fixtures.** A connection between a vent pipe and a vent stack or stack-vent shall be made at least 6 inches above the flood-level rim of the highest fixture served by the vent. Horizontal vent pipes forming branch vents or relief vents shall be at least 6 inches above the flood-level rim of the highest fixture served.

12.6.4 **Side-Inlet.** Side-inlet closet bends are permitted only in cases where the fixture connecting thereto is vented and in no case shall the inlet be used to vent a bathroom group without being washed by a fixture.

12.7 BARS AND SODA-FOUNTAIN SINKS

12.7.1 **Bar and Fountain-Sink Traps.** Traps serving sinks which are part of the equipment of bars, soda fountains, and counters need not be vented when the location and construction of such bars, soda fountains, and counters are such as to make it impossible to so do. When such conditions exist, such sinks shall discharge into a floor sink or hopper which is properly trapped, vented, and screened with 24 mesh screening.

12.7.2 **Sumps.** Sinks or sumps, receiving indirect waste, shall be located in a properly lighted and ventilated space.

12.8 FIXTURES BACK-TO-BACK

12.8.1 Distance. Two fixtures set back-to-back, within the distance allowed between a trap and its vent, may be served with one continuous soil or waste-vent pipe, provided that each fixture wastes separately into an approved double fitting having inlet openings at the same level. (See paragraph 12.10.2.)

12.9 FIXTURE VENTS

12.9.1 Distance of Trap from Vent. Each fixture trap shall have a protecting vent so located that the slope and the developed length in the fixture drain from the trap weir to the vent fitting are within the requirements set forth in Table 12.9.3.

12.9.2 Trap-Seal Protection. The plumbing system shall be provided with a system of vent piping which will permit the admission or emission of air so that under normal and intended use the seal of any fixture trap shall not be subjected to a pressure differential of more than 1 inch of water.

Table 12.9.3 DISTANCE OF FIXTURE TRAP FROM VENT

Size of Fixture drain—Inches	MAX. Distance trap to Vent
1¼	2 ft. 6 in.
1½	3 ft. 6 in.
2	5 ft. 0 in.
3	6 ft. 0 in.
4	10 ft. 0 in.

12.9.4 Trap Dip. The vent pipe opening from a soil or waste pipe, except for water closets and similar fixtures, shall not be below the top dip of the trap.

12.9.5 Crown Vent. No back vent shall be installed within two pipe diameters of the trap weir.

12.10 COMMON VENT

12.10.1 Individual Vent. An individual vent, installed vertically, may be used as a common vent for two fixture traps when both fixture drains connect with a vertical drain at the same level.

12.10.2 **Common Vent.** A common vent may be used for two fixtures set on the same floor level but connecting at different levels in the stack, provided the vertical drain is one pipe diameter larger than the upper fixture drain but in no case smaller than the lower fixture drain, whichever is the larger and that both drains conform to Table 12.9.3.

12.11 VENTS FOR FIXTURE TRAP BELOW TRAP DIP

12.11.1 **Hydraulic Gradient.** Fixture drains shall be vented within the hydraulic gradient between the trap outlet and vent connection, but in no case shall the unvented drain exceed the distance provided for in Table 12.9.3.

12.11.2 **Different Levels.** If any stack has fixtures entering at different levels, the fixtures other than the fixture entering at the highest level shall be vented, except as may be permitted in other sections of this chapter.

12.12 WET VENTING

12.12.1 **Single Bathroom Groups.** A single bathroom group of fixtures may be installed with the drain from a back-vented lavatory, kitchen sink, or combination fixture serving as a wet vent for a bathtub or shower stall and for the water closet, provided that:

(a) Not more than one fixture unit is drained into a 1½ inch diameter wet vent or not more than four fixture units drain into a 2-inch diameter wet vent.

(b) The horizontal branch connects to the stack at the same level as the water-closet drain or below the water-closet drain when installed on the top floor. It may also connect to the water-closet bend.

12.12.2 **Double Bath.** Bathroom groups back-to-back on top floor consisting of two lavatories and two bathtubs or shower stalls may be installed on the same horizontal branch with a common vent for the lavatories and with no back vent for the bathtubs or shower stalls and for the water closets, provided the wet vent is 2 inches in diameter, and the length of the fixture drain conforms to Table 12.9.3

12.12.3 **Multistory Bathroom Groups.** On the lower floors of a multistory building, the waste pipe from one or two lavatories may be used as a wet vent for one or two bathtubs or showers provided that:

(a) The wet vent and its extension to the vent stack is 2 inches in diameter.

(b) Each water closet below the top floor is individually back vented.

(c) The vent stack is sized as given in Table 12.12.3c.

Table 12.12.3c SIZE OF VENT STACKS

Number of wet-vented fixtures	Diameter of vent stacks Inches
1 or 2 bathtubs or showers	2
3 to 5 bathtubs or showers	2½
6 to 9 bathtubs or showers	3
10 to 16 bathtubs or showers	4

12.12.4 **Exception.** In multistory bathroom groups, wet vented in accordance with paragraph 12.12.3, the water closets below the top floor need not be individually vented if the 2-inch waste connects directly into the water-closet bend at a 45 deg. angle to the horizontal portion of the bend in the direction of flow.

12.12.5 **No other form of wet venting is permissible.**

12.13 STACK VENTING

12.13.1 **One-Bathroom Group.** Except as indicated in paragraph 12.13.2, a group of fixtures, consisting of one bathroom group and a kitchen sink or combination fixture, may be installed without individual fixture vents, in a one-story building or on the top floor of a building, provided each fixture drain connects independently to the stack and the water closet and bathtub or shower-stall drain enters the stack at the same level and in accordance with the requirements in Table 12.9.3.

12.13.2 **Overtaxed Sewers.** When a sink or combination fixture connects to the stack-vented bathroom group, and when the street sewer is sufficiently overloaded to cause frequent submersion of the building drain, a relief vent or back-vented fixture shall be connected to the stack below the stack-vented water closet or bathtub.

12.14 INDIVIDUAL FIXTURE REVENTING

12.14.1 Horizontal Branches. One sink and one lavatory, or three lavatories within 8 feet developed length of a main-vented line may be installed on a 2-inch horizontal waste branch without reventing, provided the branch is not less than 2 inches in diameter throughout its length, and provided the wastes are connected into the side of the branch and the branch leads to its stack connection with a pitch of not more than ¼ inch per foot.

12.14.2 Where Required. When fixtures other than water closets discharge downstream from a water closet, each fixture connecting downstream shall be individually vented.

12.14.3 Limits of Fixture Units Above Bathtubs and Water Closets. A fixture or combination of fixtures whose total discharge rating is not more than 3 fixture units may discharge into a stack not less than 3 inches in diameter without reventing, provided such fixture connections are made above the connection to the highest water closet, or bathtub tee-wye, the fixture-unit rating of the stack is not otherwise exceeded, and their waste piping is installed as otherwise required in paragraph 12.14.1.

12.15 CIRCUIT AND LOOP VENTING

12.15.1 Battery Venting. A branch soil or waste pipe to which two but not more than eight water closets (except blow-out type), pedestal urinals, trap standard to floor, shower stalls, or floor drains are connected in battery, shall be vented by a circuit vent which shall take off in front of the last fixture connection. In addition, lower-floor branches serving more than three water closets shall be provided with a relief vent taken off in front of the first fixture connection. When lavatories or similar fixtures discharge above such branches, each vertical branch shall be provided with a continuous vent.

12.15.2 Dual Branches. When parallel horizontal branches serve a total of eight water closets (four on each branch), each branch shall be provided with a relief vent at a point between the two most distant water closets. When other fixtures (than water closets) discharge above the horizontal branch, each such fixture shall be provided with a continuous vent.

12.15.3 Vent Connections. When the circuit or relief vent connections are taken off the horizontal branch, the vent branch

connection shall be taken off at a vertical angle or from the top of the horizontal branch.

12.15.4 **Fixtures Back-to-Back in Battery.** When fixtures are connected to one horizontal branch through a double wye or a sanitary tee in a vertical position, a common vent for each two fixtures back-to-back or double connection shall be provided. The common vent shall be installed in a vertical position as a continuation of the double connection.

12.15.5 **Fixture Connections.** Branch wastes and fittings for circuit vented fixtures shall be set so that the fixture drain shall enter the side of the branch drain.

12.15.6 **Loop vents. Loop vents are prohibited.**

12.16 PNEUMATIC EJECTORS

12.16.1 Relief vents from a pneumatic ejector shall not be connected to a fixture-branch vent but shall be carried separately to a vent stack or stack vent or through the roof.

12.17 RELIEF VENTS

12.17.1 **Stacks of More Than 10 Branch Intervals.** Soil and waste stacks in buildings having more than 10 branch intervals shall be provided with a relief vent at each tenth interval installed, beginning with the top floor. The size of the relief vent shall be equal to the size of the vent stack to which it connects. The lower end of each relief vent shall connect to the soil or waste stack through a wye below the horizontal branch serving the floor and the upper end shall connect to the vent stack through a wye not less than 3 feet above the floor level.

12.18 OFFSETS AT AN ANGLE LESS THAN 45 DEG. FROM THE HORIZONTAL IN BUILDINGS OF FIVE OR MORE STORIES

12.18.1 **Offset Vents.** Offsets less than 45 deg. from the horizontal, in a soil or waste stack, except as permitted in Chapter 11, Section 11.6, shall comply with paragraphs 12.18.2 and 12.18.3.

12.18.2 **Separate Venting.** Such offsets may be vented as two separate soil or waste stacks, namely, the stack section below the offset and the stack section above the offset.

12.18.3 **Offset Reliefs.** Such offsets may be vented by installing a relief vent as a vertical continuation of the lower section of the stack or as a side vent connected to the lower section between the offset and the next lower fixture or horizontal branch. The upper section of the offset shall be provided with a yoke vent. The diameter of the vents shall not be less than the diameter of the main vent, or of the soil and waste stack, whichever is the smaller.

12.19 MAIN VENTS TO CONNECT AT BASE

12.19.1 All main vents or vent stacks shall connect full size at their base to the building drain or to the main soil or waste pipe, at or below the lowest fixture branch. All vent pipes shall extend undiminished in size above the roof, or shall be reconnected with the main soil or waste vent.

12.20 VENT HEADERS

12.20.1 **Connection of Vents.** Stack-vents and vent stacks may be connected into a common vent header at the top of the stacks and then extended to the open air at one point. This header shall be sized in accordance with the requirements of Table 12.21.5, the number of units being the sum of all units on all stacks connected thereto and the developed length being the longest vent length from the intersection at the base of the most distant stack to the vent terminal in the open air as a direct extension of one stack.

12.21 SIZE AND LENGTH OF VENTS

12.21.1 **Length of Vent Stacks.** The length of the vent stack or main vent shall be its developed length from the lowest connection of the vent system with the soil stack, waste stack, or building drain to the vent stack terminal, if it terminates separately in the open air, or to the connection of the vent stack with the stack-vent, plus the developed length of the stack-vent from the connection to the terminal in the open air, if the two vents are connected together with a single extension to the open air.

12.21.2 **Size of Individual Vents.** The diameter of an individual vent shall be not less than 1¼ inches nor less than one-half the diameter of the drain to which it is connected.

12.21.3 **Size of Relief Vent.** The diameter of a relief vent shall be not less than one-half the diameter of the soil or waste branch to which it is connected.

12.21.4 **Size of Circuit Vent.** The diameter of a circuit vent shall be not less than one-half the diameter of the horizontal soil

or waste branch or the diameter of the vent stack, whichever is smaller.

12.21.5 **Size of Vent Piping.** The nominal size of vent piping shall be determined from its length and the total of fixture units connected thereto, as provided in Table 12.21.5. Twenty per cent of the total length may be installed in a horizontal position.

Table 12.21.5 SIZE AND LENGTH OF VENTS

Size of soil or waste stack	Fixture Units Connected	Diameter of Vent Required (Inches)								
		1¼	1¼	2	2½	3	4	5	6	8
		Maximum Length of Vent (Feet)								
Inches										
1¼	2	30	....	....	....	....	....	....	....	....
1½	8	50	150	....	....	....	....	....	....	....
1½	10	30	100	....	....	....	....	....	....	....
2	12	30	75	200	....	....	....	....	....	....
2	20	26	50	150	....	....	....	....	....	....
2½	42	....	30	100	300	....	....	....	....	....
3	10	....	30	100	200	600	....	....	....	....
3	30	....	....	60	200	500	....	....	....	....
3	60	....	....	50	80	400	....	....	....	....
4	100	....	....	35	100	260	1000	....	....	....
4	200	....	....	30	90	250	900	....	....	....
4	500	....	....	20	70	180	700	....	....	....
5	200	....	....	....	35	80	350	1000	....	....
5	500	....	....	....	30	70	300	900	....	....
5	1100	....	....	....	20	50	200	700	....	....
6	350	....	....	....	25	50	200	400	1300	....
6	620	....	....	....	15	30	125	300	1100	....
6	960	....	....	....	....	24	100	250	1000	....
6	1900	....	....	....	....	20	70	200	700	....
8	600	....	....	....	....	....	50	150	500	1300
8	1400	....	....	....	....	....	40	100	400	1200
8	2200	....	....	....	....	....	30	80	350	1100
9	3600	....	....	....	....	....	25	60	250	800
10	1000	....	....	....	....	....	....	75	125	1000
10	2500	....	....	....	....	....	....	50	100	500
10	3800	....	....	....	....	....	....	30	80	350
10	5600	....	....	....	....	....	....	25	60	250

12.22 COMBINATION WASTE-AND-VENT SYSTEMS

12.22.1 **Prohibited.** Combination waste-and-vent systems are prohibited.

CHAPTER 13

STORM DRAINS

13.1 GENERAL

13.1.1 **Drainage Required.** Roofs, paved areas, yards, courts, and courtyards, shall be drained into a storm-sewer system or a combined sewer where such systems are available.

13.1.2 **Prohibited Drainage.** Storm water shall not be drained into sewers inteded for sewage only.

13.1.3 **Traps.** Leaders and storm drains, when connected to a combined sewer, shall be trapped and provided with a clean-out terminating at grade.

13.1.4 **Expansion Joints.** Expansion joints or sleeves shall be provided where warranted by temperature variations or physical conditions.

13.1.5 **Subsoil Drains.** Where subsoil drains are placed under the cellar or basement floor or are used to surround the outer walls of a building, they shall be made of open-jointed or horizontally split or perforated clay tile, or perforated bituminized fiber pipe or asbestos cement pipe, not less than 4 inches in diameter. When the building is subject to backwater, the subsoil drain shall be protected by an accessibly located backwater valve. Subsoil drains may discharge into a properly trapped area drain or sump. Such sumps do not require vents.

13.1.6 **Building Subdrains.** Building subdrains located below the public sewer level shall discharge into a sump or receiving tank the contents of which shall be automatically lifted and discharged into the drainage system as required for building sumps.

13.2 MATERIALS

13.2.1 **Inside Conductors.** Conductors placed within a building or run in a vent or pipe shaft shall be of cast iron, galvanized steel, galvanized wrought iron, galvanized ferrous alloys, brass, copper (DWV or heavier), lead, or rigid plastic pipe (See Sec. 3.5).

13.2.2 **Outside Leaders.** When outside leaders are subject to mechanical injury they shall be constructed of standard weight galvanized steel pipe or equivalent.

13.2.3. **Underground Storm Drains Within Buildings.** All drains within buildings, when underground, shall be of extra heavy cast iron soil or water pipe to a distance beyond the footings or bearing walls to undisturbed earth, and in no case less than 5 feet.

13.2.4 **Building Storm Drains.** Building storm drains from a point 5 feet beyond the footings or bearing walls, or otherwise as specified in paragraph 13.2.3, shall be of cast iron soil or water pipe, vitrified clay pipe, copper pipe (DWV [illegible] heavier), concrete pipe, bituminized-fiber pipe, asbestos cement pipe, or rigid plastic pipe (see Section 3.5).

13.3 TRAPS

13.3.1 **Main Trap.** Individual storm-water traps shall be installed on the storm-water drain branch serving each conductor, or a single trap shall be installed in the main storm drain just before its connection with the combined building drain, main drain, or public sewer.

13.3.2 **Material.** Storm-water traps, when required, shall be of cast iron.

13.3.3 **No traps shall be required** for storm-water drains which are connected to a sewer carrying storm water exclusively.

13.3.4 **Traps for individual conductors** shall be the same size as the horizontal drain to which they are connected.

13.3.5 **Conductor traps** shall be so located that an accessible cleanout may be installed on the building side of the trap.

13.4 CONDUCTORS AND CONNECTIONS

13.4.1 **Conductor pipes** shall not be used as soil, waste, or vent pipes, nor shall soil, waste, or vent pipes be used as conductors.

13.4.2 **Rain-water conductors installed along alley ways,** driveways, or other locations where they may be exposed to damage shall be protected by metal guards, recessed into the wall, or constructed from standard weight galvanized steel pipe or equivalent.

13.4.3 **Combining storm with sanitary drainage.** The sanitary and storm-drainage system of a building shall be entirely separate, except that where a combined sewer is available the building storm drain may be connected in the same horizontal plane through a single Y fitting to the combined drain or sewer at least 10 feet downstream from any soil stack.

13.4.4 **Double Connections of Storm Drains.** Where the sanitary and storm drains are connected on both sides of the combined drain, single Y's shall be used and the requirements of paragraph 13.4.3 relative to the location of connections shall also apply.

13.4.5 **Floor drains connected to a storm drain shall be trapped.**

13.5 ROOF DRAINS

13.5.1 **Material.** Roof drains shall be of cast iron, copper, lead, or other acceptable corrosion-resisting material.

13.5.2 **Strainers.** All roof areas, except those draining to hanging gutters, shall be equipped with roof drains having strainers extending not less than 4 inches above the surface of the roof immediately adjacent to the roof drain. Strainers shall have an available inlet area, above roof level, of not less than 1½ times the area of the conductor or leader to which the drain is connected.

13.5.3 **Flat Decks.** Roof drain strainers for use on sun decks, parking decks, and similar areas, normally serviced and maintained, may be of the flat surface type, level with the deck and shall have an available inlet area not less than 2 times the area of the conductor or leader to which the drain is connected.

13.5.4 **Roof Drain Flashings.** The connection between roofs and roof drains which pass through the roof and into the interior of the building shall be made watertight by the use of proper flashing material.

13.6 SIZE OF LEADERS AND STORM DRAINS

13.6.1 **Vertical leaders** shall be sized on the maximum projected roof area, according to Table 13.6.1.

Table 13.6.1 SIZE OF VERTICAL LEADERS

Size of leader or conductor[1] Inches	Maximum projected roof area Square feet
2	720
2½	1300
3	2200
4	4600
5	8650
6	13500
8	29000

[1] The equivalent diameter of square or rectangular leader may be taken as the diameter of that circle which may be inscribed within the cross-sectional area of the leader.
NOTE: See footnote in Table 13.6.2.

13.6.2 **Building Storm Drain.** The size of the building storm drain or any of its horizontal branches having a slope of ½ inch or less per foot, shall be based upon the maximum projected roof area to be handled according to the following table:

Table 13.6.2 SIZE OF HORIZONTAL STORM DRAINS

Diameter of Drain	Maximum Projected Roof Area for Drains of Various Slopes		
	⅛ in. Slope	¼ in. Slope	½ in. Slope
Inches	Square Feet	Square Feet	Square Feet
3	822	1160	1644
4	1880	2650	3760
5	3340	4720	6680
6	5350	7550	10700
8	11500	16300	23000
10	20700	29200	41400
12	33300	47000	66600
15	59500	84000	119000

NOTE: Tables 13.6.1 and 13.6.2 are based upon a maximum rate of rainfall of 4 inches per hour. If it is desired to design for a maximum rate of rainfall greater than 4 inches per hour, then the figures for roof area must be adjusted proportionately by multiplying the figure by 4 and dividing by the maximum rate of rainfall in inches per hour.

13.6.3. **Roof Gutters.** The size of semicircular gutters shall be based on the maximum projected roof area, according to the following table:

Table 13.6.3 SIZE OF GUTTERS

Diameter of Gutter[1]	Maximum Projected Roof Area for Gutters of Various Slopes			
	1/16 in. Slope	1/8 in. Slope	1/4 in. Slope	1/2 in. Slope
Inches	Square Feet	Square Feet	Square Feet	Square Feet
3	170	240	340	480
4	360	510	720	1020
5	625	880	1250	1770
6	960	1360	1920	2770
7	1380	1950	2760	3900
8	1990	2800	3980	5600
10	3600	5100	7200	10000

[1] Gutters other than semicircular may be used provided they have an equivalent cross-sectional area.

13.7 SIZE OF COMBINED DRAINS AND SEWERS

13.7.1 **Conversion of Roof Area To Fixture Units.** The drainage area may be converted to equivalent fixture unit loads.

13.7.2 When the total fixture unit load on the combined drain is less than 256 fixture units, the equivalent drainage area in horizontal projection shall be taken as 1000 square feet.

13.7.3 When the total fixture-unit load exceeds 256 fixture units, each fixture unit shall be considered the equivalent of 3.9 square feet of drainage area.

13.7.4 If it is desired to design for rainfall greater than 4 inches per hour, the 1000 square foot equivalent in paragraph 13.7.2 and the 3.9 in paragraph 13.7.3 shall be adjusted by multiplying by 4 and dividing by the rainfall per hour to be provided for.

13.8 VALUES FOR CONTINUOUS FLOW

13.8.1 Where there is a continuous or semicontinuous discharge into the building storm drain, as from a pump, ejector, air-conditioning plant, or similar device, each gallon per minute of such discharge shall be computed as being equivalent to 24 square feet of roof area, based upon a 4-inch rainfall per hour.

CHAPTER 14

INSPECTION, TESTS, MAINTENANCE, AND ADMINISTRATION

14.1 INSPECTIONS

14.1.1 New Work. All new plumbing work, and such portions of existing systems as may be affected by new work or any changes, shall be inspected to insure compliance with all the requirements of this Code and to assure that the installation and construction of the plumbing system is in accordance with approved plans.

14.2 NOTIFICATION

14.2.1 Advance Notice. It shall be the duty of the holder of a permit to give a notice to the Administrative Authority when plumbing work is ready for test or inspection.

14.2.2 Plumber's Responsibility. It shall be the duty of the holder of a permit to make sure that the work will stand the test prescribed before giving the notification.

14.2.3 Retesting. If the Administrative Authority finds that the work will not pass the test, the holder of a permit shall be required to make necessary corrections and the work shall then be resubmitted for test or inspection.

14.2.4 Test. Tests shall be conducted in the presence of the Administrative Authority or his duly appointed representative.

14.3 CROSS-CONNECTION AND PLUMBING SURVEY

14.3.1 The Administrative Authority may conduct an inspection survey of any or all plumbing installations existing at the time of adoption of this Code to determine the existence of public health or safety hazards including cross-connections or back siphonage hazards which may result in contamination of the water supply. The responsible persons shall be required to correct any defects or they shall be considered to be in violation of this Code and subject to the penalties prescribed therefor.

14.4 VIOLATIONS

14.4.1 Notices of violations shall be written and mailed or delivered by the Administrative Authority to the person responsible at the time inspection was made.

14.5 REINSPECTION

14.5.1 **Reinspections.** Reinspections of plumbing installations or any part thereof shall be made when deemed necessary by the Administrative Authority.

14.6 COVERING OF WORK

14.6.1 **Requirements.** No drainage or plumbing system or part thereof shall be covered until it has been inspected, tested, and accepted as prescribed in this Code.

14.6.2 **Uncovering.** If any building drainage or plumbing system or part thereof which is installed, altered, or repaired, is covered before being inspected, tested, and approved, as prescribed in this Code, it shall be uncovered for inspection after notice to uncover the work has been issued to the responsible person by the Administrative Authority.

14.7 MATERIAL AND LABOR FOR TESTS

14.7.1 The equipment, material, and labor necessary for inspection or tests shall be furnished by the person to whom the permit is issued or by whom inspection is requested.

14.8 TESTS OF DRAINAGE AND VENT SYSTEMS

14.8.1 **Testing.** The piping of the plumbing, drainage and venting systems shall be tested with water or air prior to setting the fixtures. After the plumbing fixtures have been set and their traps filled with water, the entire drainage system shall be submitted to a final test. The Administrative Authority may require the removal of any cleanouts, to ascertain if the pressure has reached all parts of the system.

14.9 METHODS OF TESTING DRAINAGE AND VENT SYSTEMS

14.9.1 **Water Test.** The water test shall be applied to the drainage system either in its entirety or in sections. If applied

to the entire system, all openings in the piping shall be tightly closed, except the highest opening, and the system filled with water to point of overflow. If the system is tested in sections, each opening shall be tightly plugged except the highest opening of the section under test, and each section shall be filled with water, but no section shall be tested with less than a 10-foot head of water. In testing successive sections at least the upper 10 feet of the next preceding section shall be tested, so that no joint or pipe in the building (except the uppermost 10 feet of the system) shall have been submitted to a test of less than a 10-foot head of water. The water shall be kept in the system, or in the portion under test, for at least 15 minutes before inspection starts; the system shall then be tight at all points.

14.9.2 Air Test. The air test shall be made by attaching an air compressor testing apparatus to any suitable opening, and, after closing all other inlets and outlets to the system, forcing air into the system until there is a uniform gage pressure of 5 psi or sufficient to balance a column of mercury 10 inches in height. This pressure shall be held without introduction of additional air for a period of at least 15 minutes.

14.9.3 Final Test. The final test of the completed drainage and vent system may be either a smoke test or a peppermint test. Where the smoke test is preferred, it shall be made by filling all traps with water and then introducing into the entire system a pungent, thick smoke produced by one or more smoke machines. When the smoke appears at stack openings on the roof they shall be closed and a pressure equivalent to a 1-inch water column shall be built and maintained for 15 minutes before inspection starts. Where the peppermint test is preferred, 2 ounces of oil of peppermint shall be introduced for each line or stack before closing the stack and applying pressure as in the smoke test.

14.10 BUILDING DRAIN

14.10.1 Test Required. Building drains shall be tested.

14.10.2 Method. Test shall consist of plugging end of building drain at point of connection with the public sewer and filling the building drain with water and testing with not less than a 10-foot head of water, or a flow test as provided by the Administrative Authority may be substituted.

14.11 INSPECTION AND TEST NOT REQUIRED

14.11.1 No test or inspection shall be required where a plumbing system, or part thereof, is set up for exhibition purposes and has no connection with a water or drainage system.

14.12 TEST OF WATER-SUPPLY SYSTEM

14.12.1 Upon completion of a section or of the entire water-supply system, it shall be tested and proved tight under a water pressure not less than 50 per cent greater than the working pressure under which it is to be used. The water used for tests shall be obtained from a potable source of supply.

14.13 TEST OF INTERIOR LEADERS OR DOWNSPOUTS

14.13.1 Leaders or downspouts and branches within a building shall be tested by water or air in accordance with paragraph 14.9.1 or 14.9.2.

14.14 CERTIFICATE OF APPROVAL

14.14.1 Upon the satisfactory completion and final test of the plumbing system a certificate of approval shall be issued by the Administrative Authority to the plumber to be delivered to the owner.

14.15 DEFECTIVE PLUMBING

14.15.1 Wherever there is reason to believe that the plumbing system of any building has become defective, it shall be subjected to test or inspection and any defects found shall be corrected as required in writing by the Administrative Authority.

14.16 MAINTENANCE

14.16.1 The plumbing and drainage system of any premises under the jurisdiction of the Administrative Authority shall be maintained in a sanitary and safe operating condition by the owner or his agent.

14.17 ADMINISTRATION

14.17.1 **Permit For Plumbing Work.**

14.17.1a Issuance of Permit. No plumbing work, unless excepted in this section, shall be undertaken prior to the issuance of a permit therefor by the Administrative Authority. Permit shall be issued to a licensed plumber, except as provided in 14.17.1b.

14.17.1b. Exception. Any permit required by this Code may be issued to any person to do any work regulated by this Code in a single-family dwelling used exclusively for living purposes, including the usual accessory buildings and quarters in connection with such buildings, provided the person is the bonafide owner of such dwelling and that the same will be occupied by said owner and that said owner shall personally purchase all material and perform all labor in connection therewith, and provided that all workmanship, methods, and materials shall meet the requirements of this Code.

14.17.1c Application for Permit. Application for permit shall be made on suitable forms provided by Administrative Authority. The application shall be accompanied by fees in accordance with schedule of fees.

14.17.1d Schedule of Fees. Fees shall be in accordance with the Official Schedule as prepared by the Administrative Authority.

14.17.2 REQUIREMENTS FOR PLUMBING PERMITS

14.17.2a Plans and Specifications. No permit shall be issued until plans and specifications showing the proposed work in necessary detail have been submitted to the Administrative Authority or authorized representative and it has been determined from examination of such plans and specifications that they give assurance that the work will conform to the provisions of this Code. If a permit is denied, the applicant may submit revised plans and specifications without payment of additional fee. If, in the course of the work, it is found necessary to make any change from the plans and specifications on which a permit has been issued, amended plans and specifications shall be submitted and a supplementary permit, subject to the same conditions applicable to original application for permit, shall be obtained to cover the change.

14.17.2b Repairs. Repairs involving only the working parts of a faucet or valve, the clearance of stoppages, repairing of

leaks, or replacement of defective faucets or valves may be made without a permit provided no changes are made in the piping to the fixtures.

14.17.2c **Protection of Water-supply System.** The Administrative Authority may also make rules and regulations in furtherance of the purposes of this Code and not inconsistent with the specific provisions of this Code, for the installation, repair or alteration of air-conditioning systems, water-treatment equipment, and water-operated devices as may be deemed necessary to properly protect the water-supply system.

14.17.3 ENFORCEMENT

14.17.3a **Inspections and Tests.** It shall be the duty of the Administrative Authority to enforce the provisions of this Code and to make the inspections and tests required thereunder.

14.17.3b **Right of Entry.** The authorized representative of the Administrative Authority shall, after proper identification, have the right to enter any premises for the purpose of inspecting any plumbing system at such times as may be reasonably necessary for the enforcement of this Code.

APPENDIX A

SIZING THE WATER SUPPLY SYSTEM

Proper design of the water-distributing system in a building is necessary in order that the various fixtures may function properly. The amount of either hot or cold water used in any building is variable, depending on the type of structure, usage, occupancy, and time of day. It is necessary to provide piping, water heating, and storage facilities of sufficient capacity to meet the peak demand without wasteful excess in either piping or equivalent cost.

For additional information on this subject the reader is referred to "Water Supply Piping for Plumbing Systems" by F. M. Dawson and A. A. Kalinske; "Technical Bulletin No. 3 of the National Association of Master Plumbers"; "Water-Distributing Systems for Buildings" by Roy B. Hunter; Report BMS 79 of the National Bureau of Standards, and Plumbing Manual—Report BMS 66 also published by the National Bureau of Standards.

This appendix gives a suggested procedure for sizing the water-supply system prepared by F. M. Dawson.

A.1 PRELIMINARY INFORMATION

A.1.1 Available Pressure. Obtain the necessary information regarding the minimum daily service pressure in the area where the building is to be located.

A.1.2 Piping Material. Obtain all available local information regarding the use of different kinds of pipe with respect both to durability and to decrease in capacity with length of service in the particular water supply.

A.2 ESTIMATE OF DEMAND LOAD AND PIPE CAPACITY

A.2.1 Rate of Flow. One of the important items that must be determined before any part of the water-piping system can be sized is the probable rate of flow in any particular reach of piping. The rate of flow in the service line, risers, and main branches,

however, will rarely be equal to the sum of the rates of flow of all connected fixtures. In fact, the probability of every fixture in a large group being used at the same time is so remote that it would be very poor engineering to design the piping large enough to take care of such simultaneous flow.

A.2.2 **Simultaneous Use.** The demand load in building water-supply systems can not be determined exactly and is not readily standardized. The two main problems to be considered are: (1) the satisfactory supply of water for a given fixture and (2) the number of fixtures which may be assumed to be in use at the same time.

A.2.3 **Daily Demand.** The minimum flow that will be satisfactory to the consumer depends greatly on the consumer, his standard of living, his professional needs, size of family, garden requirements and similar factors. Depending on those factors, per capita water consumption for domestic use usually varies between 50 to 80 gallons per day.

A.2.4 **Type of Building.** Experience indicates that the type of dwelling has considerable influence on the water consumption.

A.2.5 **Apartment Buildings.** In apartment houses the per capita daily water consumption is generally higher than in single family houses. This is due to the central metering system which is not conducive to the saving of water and to long hot-water lines which result in high heat losses, thus in the wasting of the cooled water. In designing water supply systems for apartment houses, a daily per capita water consumption of 100 gallons may be considered a safe design figure.

A.2.6 **Dwellings.** Although a considerable number of housing projects have been developed across the nation, conclusive water-consumption data have not been gathered as yet. Nevertheless, it seems that the daily per capita water consumption in housing projects falls in between the consumption in apartment houses and single dwellings at the same geographical location. In general, a daily per capita water consumption of 75 gallons can be used as a safe design figure for housing projects.

A.3—FLOW AND PRESSURE REQUIRED

A.3.1 Table A.3.4 gives the rate of flow desirable for many common types of fixtures, and the average pressure necessary to

give this rate of flow. The pressure necessarily varies with fixture design; with some, a much greater pressure is necessary to give the same rate of flow than with others.

A.3.2 In estimating the load, the rate of flow is frequently computed in fixture units.

A.3.3 Table A.3.5 gives the demand weight in terms of fixture units for different plumbing fixtures under several conditions of service.

Table A.3.4 RATE OF FLOW AND REQUIRED PRESSURE DURING FLOW FOR DIFFERENT FIXTURES

Fixture	Flow Pressure (a) psi	Flow rate gpm
Ordinary basin faucet	8	3.0
Self-closing basin faucet	12	2.5
Sink Faucet—$\frac{3}{8}$ in.	10	4.5
Sink Faucet—$\frac{1}{2}$ in.	5	4.5
Bathtub faucet	5	6.0
Laundry tub cock—$\frac{1}{2}$ in.	5	5.0
Shower	12	5.0
Ball-cock for closet	15	3.0
Flush valve for closet	10-20	15-40 (b)
Flush valve for urinal	15	15.0
Garden hose, 50 ft. and sill cock	30	5.0

(a) Flow pressure is the pressure in the pipe at the entrance to the particular fixture considered.

(b) Wide range due to variation in design and type of flush-valve closets.

Table A.3.5 DEMAND WEIGHT OF FIXTURES IN FIXTURE UNITS (a)

Fixture or Group (b)	Occupancy	Type of Supply Control	Weight in Fixture Units (c)
Water closet	Public	Flush valve	10
Water closet	Public	Flush tank	5
Pedestal urinal	Public	Flush valve	10
Stall or wall urinal	Public	Flush valve	5
Stall or wall urinal	Public	Flush tank	3
Lavatory	Public	Faucet	2
Bathtub	Public	Faucet	4
Shower head	Public	Mixing valve	4
Service sink	Office, etc.	Faucet	3
Kitchen sink	Hotel or restaurant	Faucet	4
Water closet	Private	Flush valve	6
Water closet	Private	Flush tank	3
Lavatory	Private	Faucet	1
Bathtub	Private	Faucet	2
Shower head	Private	Mixing valve	2
Bathroom group	Private	Flush valve for closet	8
Bathroom group	Private	Flush tank for closet	6
Separate shower	Private	Mixing valve	2
Kitchen sink	Private	Faucet	2
Laundry trays (1-3)	Private	Faucet	3
Combination fixture	Private	Faucet	3

(a) For supply outlets likely to impose continuous demands estimate continuous supply separately and add to total demand for fixtures.

(b) For fixtures not listed weights may be assumed by comparing the fixture to a listed one using water in similar quantities and at similar rates.

(c) The given weights are for total demand. For fixtures with both hot and cold water supplies, the weights for maximum separate demands may be taken as three-fourths the listed demand for supply.

A.3.6 Chart No. 1 gives the estimated demand in gallons per minute corresponding to any total number of fixture units. Chart No. 2 shows an enlargement of Chart No. 1 for a range up to 250 fixture units.

A.3.7 The estimated demand load for fixtures used intermittently on any supply pipe will be obtained by multiplying

the number of each kind of fixture supplied through that pipe by its weight from Table A.3.5, adding the products, and then referring to the appropriate curve of Chart Nos. 1 or 2 to find the

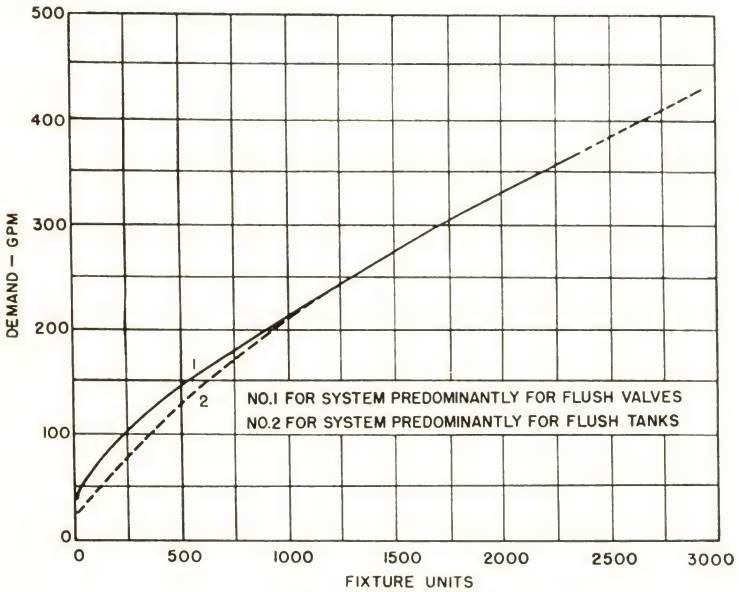


Chart No.1 – ESTIMATE CURVES FOR DEMAND LOAD

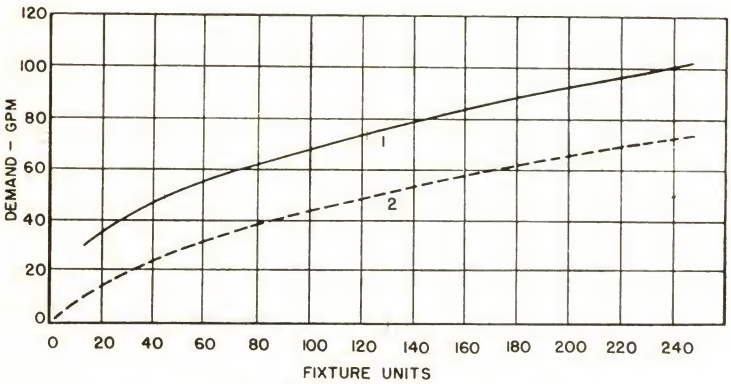


Chart No.2 – ENLARGED SCALE DEMAND LOAD

demand corresponding to the total fixture units. In using this method it should be noted that the demand for fixture or supply outlets other than those listed in the table of fixture units is not yet included in the estimate. The demands for outlets (such as hose connections, air conditioning apparatus, etc.) which are likely to impose continuous demand during times of heavy use of the weighted fixtures, should be estimated separately and added to the demand for fixtures used intermittently, in order to estimate the total demand.

A.4 SIZING COLD-WATER-SUPPLY PIPING

A.4.1 **Pressure Loss.** As water flows through a pipe, the pressure continually decreases along the pipe, due to loss of energy from friction. The problem is then one of ascertaining the minimum pressure in the street main, and the minimum pressure required for the operation of the topmost fixture. (A pressure of 15 psi is ample for flush valves, but reference should be made to the manufacturers' requirements. A minimum of 8 psi should be allowed for other fixtures.) The pressure differential thus obtained will be available for overcoming pressure losses in the distributing system and in overcoming the difference in elevation between the water main and the highest fixture.

A.4.2 **Pressure Loss by Elevation.** The pressure loss, in pounds per square inch, caused by the difference in elevation between the street main and the highest fixture, may be obtained by multiplying the difference in elevation in feet by the conversion factor 0.43.

A.4.3 **Water Flow.** When water flows through a pipe, friction occurs as the result of the sliding of water particles past one another. If the pipe wall is rough, the roughness projections cause additional friction, owing to the development of increased turbulence in the flowing water. As the water flows along a smooth pipe, the pressure decreases as a result of a dissipation of energy arising from the internal friction set up by viscosity of the water. This loss in energy is shown by the loss of pressure. The pressure loss is proportioned to the length of straight uniform pipes, and varies greatly with flow velocity, pipe diameter, and roughness of pipe.

A.5 PIPE CLASSIFICATION

A.5.1 **On the basis of inside surface conditions,** pipes may be classified as smooth, fairly rough, and rough, as follows:

A.5.2 **Smooth Pipe.** The inside pipe surface shows no perceptible roughness. Pipes made of copper, brass, plastic, or lead may usually be classified as smooth.

A.5.3 Fairly Rough. All ordinary pipes, such as wrought iron, galvanized iron, steel, and cast iron, after a few years of usage, may be called fairly rough.

A.5.4 Rough. Pipes that have deteriorated fairly rapidly for some 10 or 15 years after being laid, are classified as rough.

A.6 FLOW CHARTS

A.6.1 Charts 3, 4 and 5 give the pipe-friction losses corresponding to these three types of pipes for various nominal diameters.

Example 1—A 2½ inch fairly rough pipe supplies 100 gpm of water. Find the friction loss in head if the pipe length is 200 ft.

Solution—Enter Chart 4 at 100 gpm and move along this line until it intersects the 2½ inch diameter line. From this intersection point, move vertically down and read 4.5 psi friction loss per 100 feet of pipe length. Then the total friction loss will be 2 x 4.5 = 9 psi.

A.7 FITTINGS, VALVES, AND METERS

A.7.1 The pressure losses in the distributing system will consist of the pressure losses in the piping itself, plus the pressure losses in the pipe fittings, valves, and the water meter. Estimated pressure losses for disc-type meters for various rates of flow are given in Chart No. 6.

A.7.2 Flow limits for disc-type meters, which may be regarded as the limits of recommended ranges in capacities, are given in Table A.7.3. For information on other types of meters, the manufacturer should be consulted.

Table A.7.3 PERFORMANCE REQUIREMENTS OF WATER METERS (a)

Pipe Size In.	Normal Test-Flow Limits Gpm	Minimum Test Flow Hours
⅝	1 to 20	¼
¾	2 to 34	½
1	3 to 53	¾
1½	5 to 100	1½
2	8 to 160	2
3	16 to 315	4
4	28 to 500	7
6	48 to 1,000	12

(a) American Water Works Association Standards.

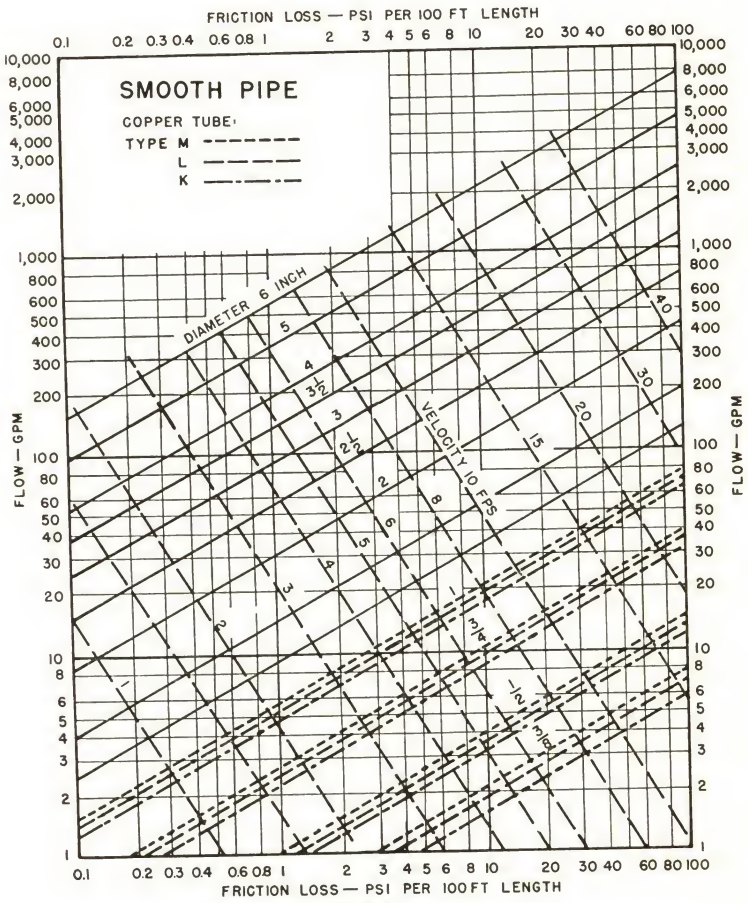

FRICTION LOSS — PSI PER 100 FT LENGTH
0.1 0.2 0.3 0.4 0.6 0.8 1 2 3 4 5 6 8 10 20 30 40 60 80 100
SMOOTH PIPE
COPPER TUBE
TYPE M
L
K
DIAMETER 6 INCH
5
4
3½
3
2½
2
1½
1¼
1
VELOCITY 10 FPS
40
30
20
15
8
6
5
4
3
2
1
FLOW — GPM
10,000
8,000
6,000
5,000
4,000
3,000
2,000
1,000
800
600
500
400
300
200
100
80
60
50
40
30
20
10
8
6
5
4
3
2
1
FRICTION LOSS — PSI PER 100 FT LENGTH

Chart 3

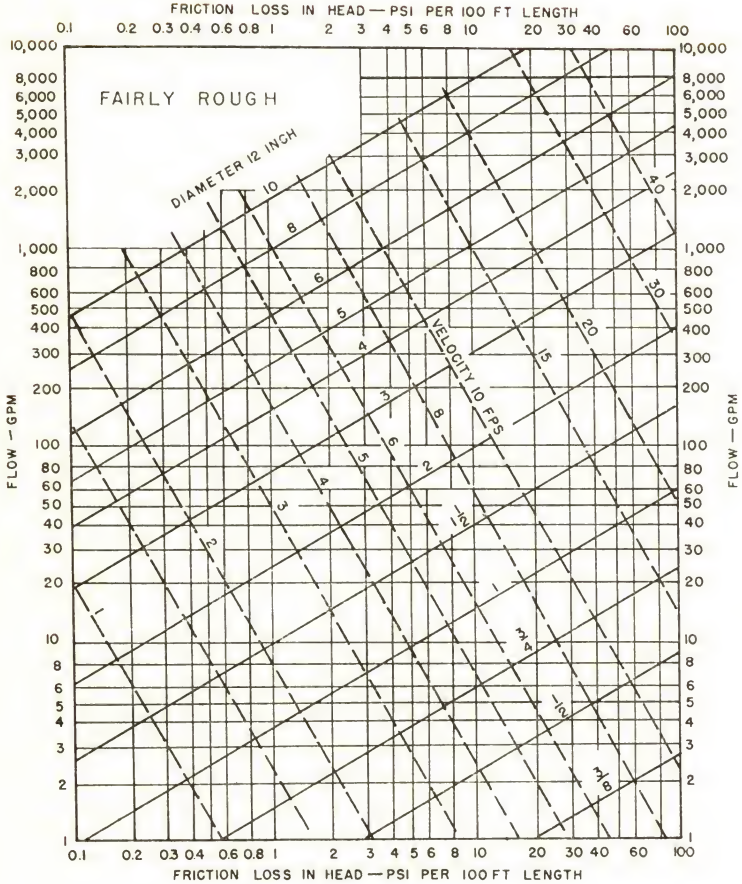

FRICTION LOSS IN HEAD — PSI PER 100 FT LENGTH
0.1 0.2 0.3 0.4 0.6 0.8 1 2 3 4 5 6 8 10 20 30 40 60 100
FAIRLY ROUGH
DIAMETER 12 INCH
10
8
6
5
4
3
2
1
VELOCITY 10 FPS
8
6
5
4
3
2
1
40
30
20
15
10
8
6
5
4
3
2
1
1¼
1½
2
FLOW — GPM
10,000
8,000
6,000
5,000
4,000
3,000
2,000
1,000
800
600
500
400
300
200
100
80
60
50
40
30
20
10
8
6
5
4
3
2
1
FRICTION LOSS IN HEAD — PSI PER 100 FT LENGTH

Chart 4

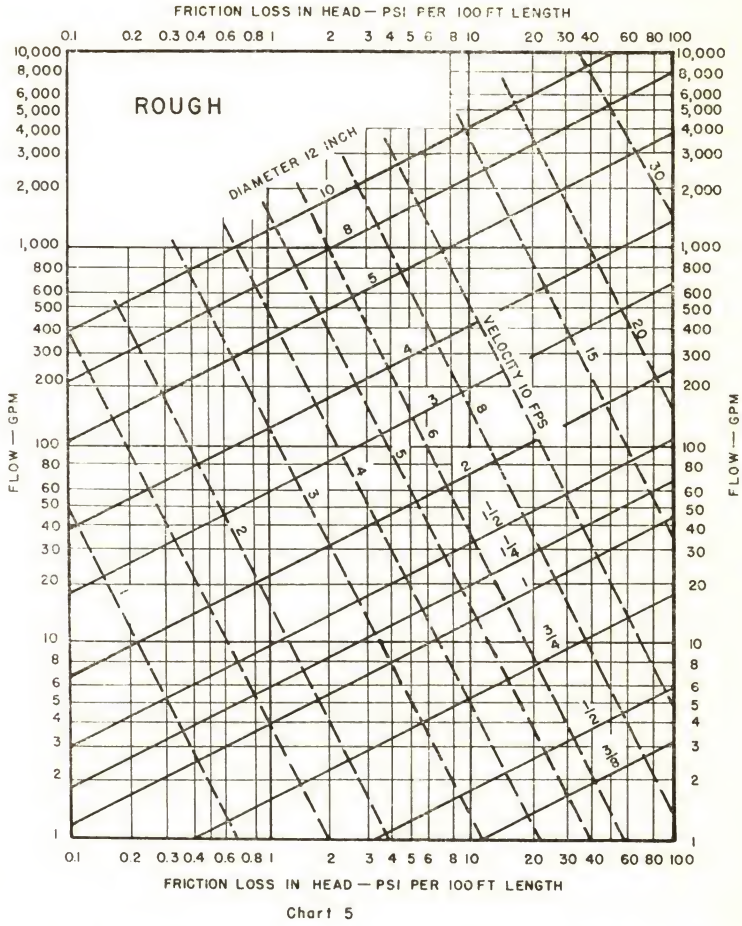


Chart 5

A.7.4 **Registration.** The registration on the meter dial shall indicate the quantity recorded to be not less than 98 per cent nor more than 102 per cent of the water actually passed through the meter while it is being tested at rates of flow within the specified limits (See Table A.7.3) under normal test-flow limits. There shall be not less than 90 per cent of the actual flow recorded when a test is made at the rate of flow set forth under minimum test flow.

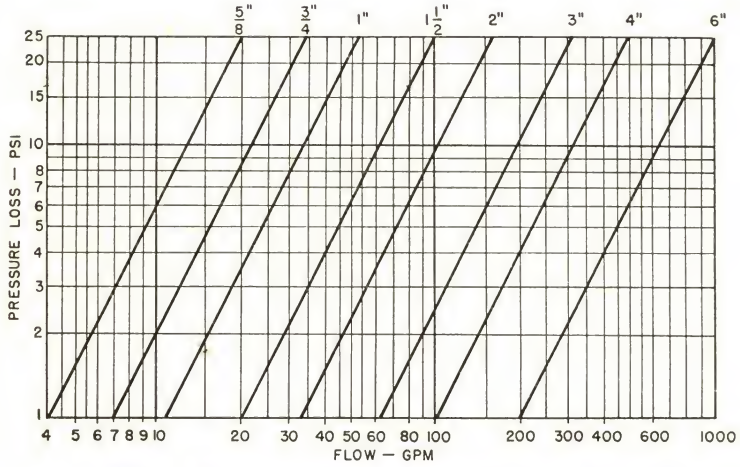


Chart 6 PRESSURE LOSSES IN DISK-TYPE WATER METERS

A.7.5 Chart 7 shows the variation of pressure loss with rate of flow for various types of faucets and cocks, based on experimental data obtained at the State University of Iowa.

A ½ in. laundry bib (old style)
B Laundry compression faucet
C_1 ½ in. compression sink faucet (manufacturer 1)
C_2 ½ in. compression sink faucet (manufacturer 2)
D Comb. comp. bathtub faucet (both open)
E Comb. compression sink faucet
F Basin faucet
G Spring self-closing faucet
H Slow self-closing basin faucet

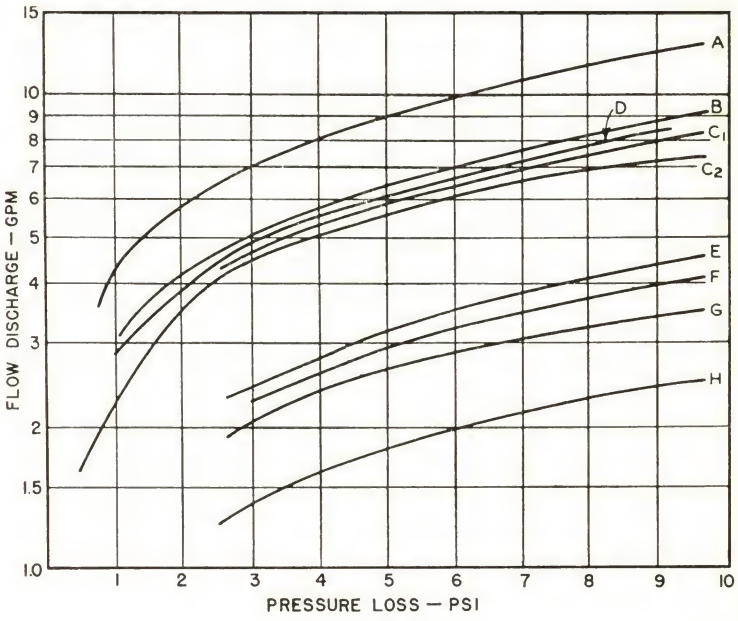


Chart No. 7

A.7.6 The loss of pressure through any fitting or valve can be expressed in pounds per square inch for any given rate of flow. Experience has shown, however, that the simplest method of expressing losses in fittings and valves is to use the concept of an equivalent length of straight pipe. It has been found, for example, that a 1-inch, 90-degree elbow, introduces a loss which is equivalent to 2.2-feet of straight 1-inch pipe. Therefore, for each 1-inch, 90-degree elbow, 2.2-feet of 1-inch pipe are added to the total length of 1-inch pipe.

A.7.7 Estimated pressure losses for pipe fittings and valves in terms of equivalent pipe lengths are shown in Table A.7.8.

Table A.7.8 ALLOWANCE IN EQUIVALENT LENGTH OF PIPE FOR FRICTION LOSS IN VALVES AND THREADED FITTINGS

Diameter of Fitting Inches	90 Deg Standard Ell Feet	45 Deg Standard Ell Feet	90 Deg Side Tee Feet	Coupling or Straight Run of Tee Feet	Gate Valve Feet	Globe Valve Feet	Angle Valve Feet
⅜	1	0.6	1.5	0.3	0.2	8	4
½	2	1.2	3	0.6	0.4	15	8
¾	2.5	1.5	4	0.8	0.5	20	12
1	3	1.8	5	0.9	0.6	25	15
1¼	4	2.4	6	1.2	0.8	35	18
1½	5	3	7	1.5	1.0	45	22
2	7	4	10	2	1.3	55	28
2½	8	5	12	2.5	1.6	65	34
3	10	6	15	3	2	80	40
3½	12	7	18	3.6	2.4	100	50
4	14	8	21	4.0	2.7	125	55
5	17	10	25	5	3.3	140	70
6	20	12	30	6	4	165	80

A.7.9 Table A.7.10 lists the equivalent lengths for various special types of apparatus and fittings. The loss in water meters varies considerably with the design even in meters of the same nominal size. The values given in Table A.7.10 are ample for the well known meters now on the market.

Table A.7.10 EQUIVALENT LENGTHS OF IRON PIPE TO GIVE SAME LOSS AS SPECIAL FITTINGS OR APPARATUS

Fitting Apparatus	Nominal Diameter of Pipe			
	½ In. Feet	¾ In. Feet	1 In. Feet	1¼ In. Feet
30-gal. Vertical hot-water tank ¾-in. pipe	4	17	56	...
30-gal. Horizontal hot-water tank, ¾-in. pipe	1.2	5	16	...
Water meters (No valves included)				
⅝ in. with ½ in. connections	6.7	28	90	...
⅝ in. with ¾ in. connections	4.8	20	64	...
¾ in. with ¾ in. connections	3.4	14	45	...
1 in. with 1-in. connections	...	9	30	115
1¼ in. with 1-in. connections	...	4.4	14	54
Water softener	...	50-200	..	...

Example 2—Assume a minimum street-main pressure of 55 psi; a height of topmost fixture above street main of 50 ft.; a developed pipe length from water main to highest fixture of 100 ft.; a total load on the system of 50 fixture units; and that the water closets are flush-valve operated. Find the required size of supply main.

Solution—From Chart No. 2 the estimated peak demand is found to be 51 gpm. From Table A.7.3 it is evident that several sizes of meters would adequately measure this flow. For a trial computation choose the 1½-in. meter. From Chart No. 6 the pressure drop through a 1½-inch disc-type meter for a flow of 51 gpm is found to be 6.5 psi.

Then the pressure drop available for overcoming friction in pipes and fittings is 55—(15 + 50 times 0.43 + 6.5) = 12 psi. At this point it is necessary to make some estimate of the equivalent pipe length of the fittings on the direct line from the street main to the highest fixture. The exact equivalent length of the various fittings cannot now be determined since the pipe sizes of the building main, riser, and branch leading to the highest fixture are not known as yet, but a first approximation is

necessary in order to make a tentative selection of pipe sizes. If the computed pipe sizes differ from those used in determining the equivalent length of pipe fittings, a recalculation will be necessary, using the computed pipe sizes for the fittings. For the purposes of this example assume that the total equivalent length of the pipe fitting is 50 feet. Then the permissible pressure loss per 100 ft. of equivalent pipe is 12 times 100/(100 + 50) = 8 psi.

Assuming that the corrosive and caking properties of the water are such that Chart No. 4 for fairly rough pipe is applicable, a 2-in. building main will be adequate.

The sizing of the branches of the building-main, the risers, and fixture branches follow the principles outlined. For example, assume that one of the branches of the building-main carried the cold water supply for 3 water closets, 2 bathtubs, and 3 lavatories. Using the permissible pressure loss of 8 psi per 100 ft., the size of branch determined from Table A.3.5, and Charts 2 and 4 is found to be 1½ in. Items entering the computation of pipe size are given in Table A.7.11.

Table A.7.11 COMPUTATION OF BRANCH SIZE IN EXAMPLE 2

Number and Kind of Fixtures	Fixture Units (from Table A.3.5 & Note C)	Demand (from Chart 2)	Pipe Size (from Chart 4)
			Inches
3 flush valves	3x6 =18		
2 bathtubs	¾(2x2)= 3		
3 lavatories	¾(3x1)= 2.25		
Total	23.25	38	1½

A-8 UP-FEED AND DOWN-FEED SYSTEMS

A.8.1 The principles involved in sizing either up-feed or down-feed systems are the same. The principal difference in procedure is that in the down-feed system, the difference in elevation between the house tank and the fixtures provides the pressure required to overcome pipe friction.

A.8.2 The water demand for hose bibbs or other large-demand fixtures taken off the building main is frequently the cause of inadequate water supply to the upper floor of a building. This condition may be prevented by sizing the distribution system so that the pressure drops from the street-main to all fixtures are the same. It is good practice to maintain the building main of ample size (not less than 1 in. where possible) until all branches to hose bibbs have been connected. Where the street-main pressure is excessive and a pressure reducing valve is used to prevent water hammer or excessive pressure at the fixtures, it is frequently desirable to connect hose bibbs ahead of the reducing valve.

A.8.3 The recommended procedure in sizing pipe systems may be outlined as follows:

1) Draw a sketch of the main lines, risers, and branches indicating the fixtures served. Indicate the rate of flow of each fixture.

2) Using Table A.3.5, compute the demand weights of the fixtures in fixture units.

3) Determine the total demand in fixture units and, using Chart 1 or Chart 2, find the expected demand in gallons per minute.

4) Determine the equivalent length of pipe in the main lines, risers, and branches. Since the sizes of the pipes are not known, the exact equivalent length for various fittings, etc., cannot be made. Add up the equivalent lengths starting at the street main and proceeding along the service line, main line in the building, and up the riser to the top fixture of the group served.

5) Determine the average minimum pressure in the street main and the minimum pressure required for the operation of the top-most fixture. This latter pressure should be 8 to 15 psi.

6) Calculate the approximate value of the average pressure drop per 100 feet of pipe in the equivalent length determined in Item 4.

Do this according to the following rule:

$$p = (P - 0.43\ H - 10)\ \frac{100}{L}$$

where p = average pressure loss per 100 feet of equivalent length of pipe in psi

P = pressure in street-main in psi

H = height of highest fixture above street main, in feet

L = equivalent length determined in Item 4.

If the system is of the down-feed supply from a gravity tank, the height of water in the tank converted to pounds per square inch by multiplying 0.43 replaces the street-main pressure and the term 0.43H in the equation in Item 6 is added instead of subtracted in calculating the term p. In this case H will be the vertical distance of the fixture below the bottom of the tank.

7) From the expected rate of flow determined in Item 3 and the value of p calculated in Item 6, choose the sizes of pipe, from Charts 3, 4 or 5.

APPENDIX B

INDIVIDUAL SEWAGE DISPOSAL SYSTEMS

The most satisfactory method of disposing of sewage is by connection to a public sewerage system. Every effort should be made to secure public sewer extensions. When connection to a public sewer is not feasible and when a considerable number of residences are to be served, consideration should be given to the construction of a community sewer system and treatment plant. Specific information on this matter may be obtained from the Sanitary Water Board of Illinois.

B.1 GENERAL

B.1.1 Sanitary Water Board Law. Plans and specifications of sewerage works to serve 15 persons or more shall be submitted to the Sanitary Water Board of the State of Illinois for approval prior to commending construction, in accordance with the Illinois Sanitary Water Board Law.

B.1.2 Approval Required. Before any individual septic tank system is installed, approval must be obtained from the Administrative Authority. Septic tank systems shall not be approved where a public sewer is available. Such means of disposal shall be discontinued when public sewers are, or become available.

B.1.3 Design. The design of the individual sewage-disposal system must take into consideration location with respect to wells or other sources of water supply, topography, water table, soil characteristics, area available, maximum occupancy of the building, and any special appliances which may discharge into the system.

B.1.4 Type of System. The type of system to be installed shall be determined on the basis of location, soil permeability, and ground-water elevation.

B.1.5 Sanitary Sewage. The system shall be designed to receive all sanitary sewage from the building, including laundry waste, sink drains, and floor or basement drains. Drainage from footings or roofs shall not enter the system.

B.1.6 Complete Treatment Required. The system shall consist of a septic tank discharging into a subsurface disposal field

constructed in accordance with the specifications set forth in Sections B.4 through B.9.

B.1.7 Alternate Design. Where soil conditions are such that the system mentioned in B.1.6 cannot be expected to operate satisfactorily, approval of an alternate design shall be secured from the Administrative Authority with concurrence of the proper health authorities having jurisdiction.

B.2 LOCATION

B.2.1 Distances. Table B.2.2 provides for the minimum distances that shall be observed in locating the various components of the disposal system.

Table B.2.2 LOCATION OF COMPONENTS OF SEWAGE DISPOSAL SYSTEM

Type of System	Distance				
	Well or Suction Line Feet	Water Supply Line (Pressure) Feet	Stream Feet	Dwelling Feet	Property Line Feet
Building Sewer	50	10	..	..	..
Septic Tank	50	10	..	..	..
Distribution Box	75	10	..	..	..
Disposal Field	75	10	25	10	10

NOTE: Distances listed above apply only in clay and loam soils. In gravel and sand formations safe distances will be variable being greater than for clay and loam soil. In areas where shallow or out-cropping creviced limestone is prevalent no safe distance can be established and the Administrative Authority or Health Authority having jurisdiction should be contacted.

B.3 BUILDING SEWER

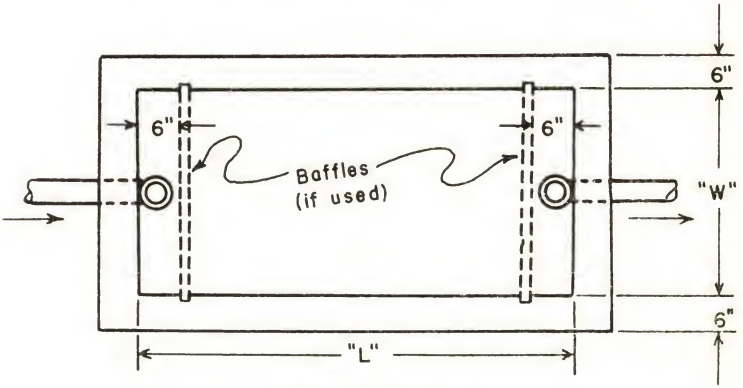
B.3.1 Size. The sewer shall be of a minimum size to serve the connected fixtures as determined from Chapter 11 of the Code.

B.3.2 Slope. The sewer shall have a minimum slope as determined in Chapter 11, Table 11.5.3, except that the slope of the sewer 10 feet preceding the tank connection shall not exceed ¼ inch per foot.

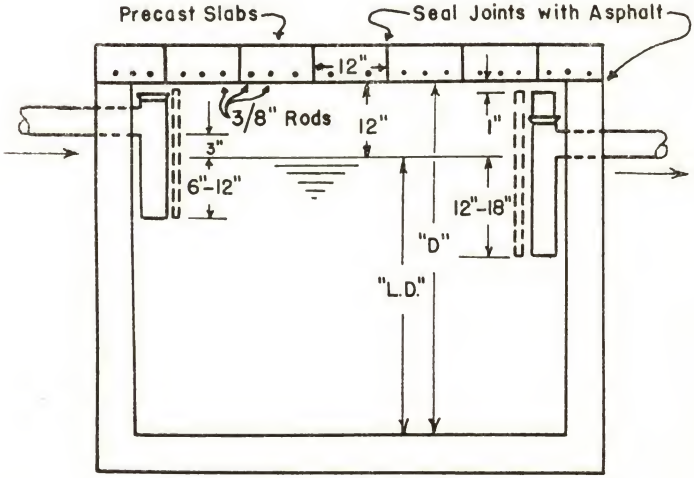
B.4 SEPTIC TANK

B.4.1 Capacity. The septic tank shall have a minimum capacity in accordance with the provisions of Table B.4.2.

RECTANGULAR SEPTIC TANK



PLAN VIEW



SIDE ELEVATION

Figure I.

CYLINDRICAL SEPTIC TANK

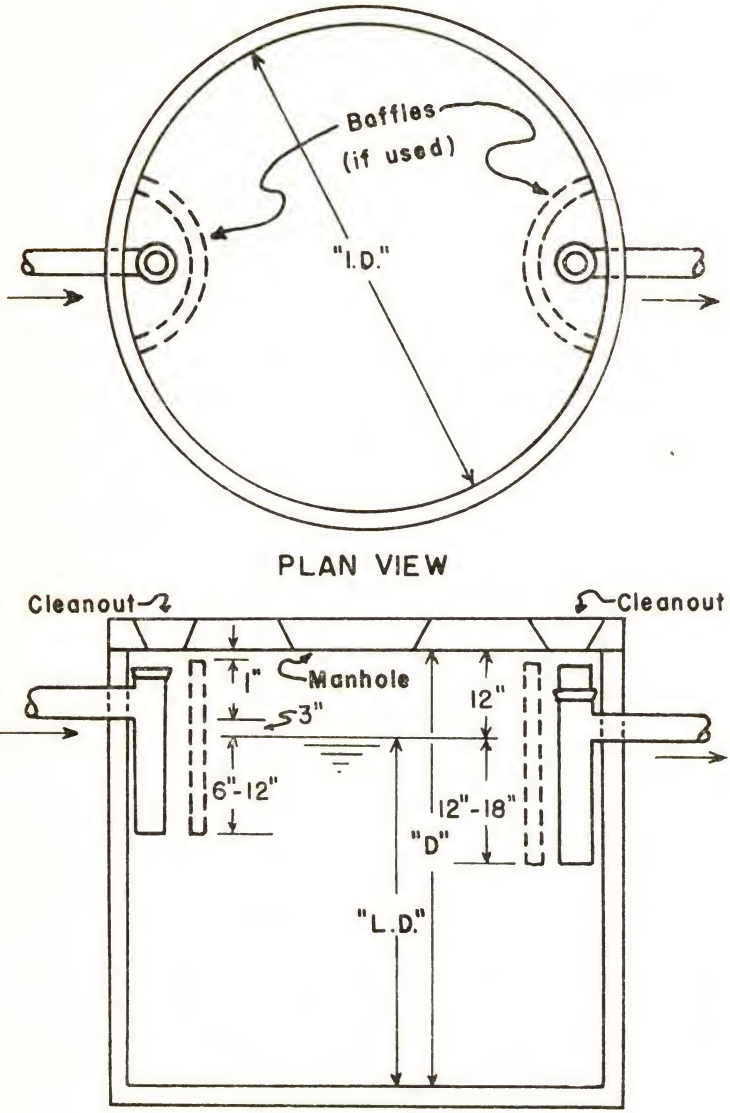


Figure 2.

Table B.4.2 MINIMUM CAPACITIES FOR SEPTIC TANKS SERVING AN INDIVIDUAL DWELLING

(See Figures 1 and 2)

Number of Bedrooms	Maximum Number of Persons Served	Nominal Liquid Capacity of Tank	Recommended Inside Dimensions									
			Length "L"		Width "W"		Liquid Depth* "L.D."		Total Depth "D"		Inside Diameter "I.D."	
	Persons	Gallons	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.	Ft.	In.
2 or less	4	500	6	0	3	0	4	0	5	0	4	8
3	6	600	7	0	3	0	4	0	5	0	5	1
4	8	750	7	6	3	6	4	0	5	0	5	8
5	10	900	8	6	3	6	4	6	5	6	5	10
6	12	1,100	8	6	4	0	4	6	5	6	6	6
7	14	1,300	10	0	4	0	4	6	5	6	7	0
8	16	1,500	10	0	4	6	4	6	5	6	7	6

* NOTE: The minimum allowable liquid depth shall be 4 feet. Liquid depths greater than 6 feet shall not be considered when determining capacity.

B.4.3 **Multiple Compartments.** In tanks of more than one compartment, the inlet compartment shall have a capacity of not less than the required minimum capacity as specified in Table B.4.2.

B.4.4 **Garbage Disposal.** Where domestic garbage disposal units are installed or contemplated, the capacity of the septic tank shall be at least 50 per cent greater than the requirements given in Table B.4.2.

B.4.5 **Length.** Septic Tanks shall be at least twice as long as they are wide, except that cylindrical tanks are approved.

B.4.6 **Depth.** The minimum allowable liquid depth shall be 4 feet. The total depth shall be such that 12 inches of air space shall be provided between the bottom of the cover and the invert of the outlet pipe.

B.4.7 **Construction.** Septic tanks shall be constructed of corrosion-resistant materials and be of permanent construction. The cover of the tank shall be designed for a dead load of not less than 150 pounds per square foot and, if of concrete, should be reinforced and not less than 3 inches thick.

B.4.8 Manholes. The inlet compartment must be provided with at least one manhole. Other compartments may be provided with a manhole. Manholes shall be at least 20 inches square or 24 inches in diameter and provided with close-fitting covers. Where removable slab covers are provided, manholes are not required.

B.4.9 Baffles. If inlet and outlet baffles are used, they shall extend the full width of the tank and be located 6 inches from the end walls. Such baffles shall extend at least 10 inches above the flow line, but not closer than 1 inch to the under side of the cover. Inlet baffles shall extend 6 - 12 inches below the flow line and outlet baffles shall extend 12 - 18 inches below the flow line.

B.4.10 Pipe Inlet and Outlet. In lieu of baffles, submerged pipe inlets and outlets may be installed consisting of concrete, vitrified clay, or cast-iron sanitary tee's with a short section of pipe to the required depth as indicated in paragraph B.4.9.

B.4.11 Invert. The invert of the inlet pipe shall be located at least 3 inches above the invert of the outlet.

B.4.12 Dosing Chambers. Dosing chambers are not required in the case of individual disposal systems.

B.5 DISTRIBUTION BOX

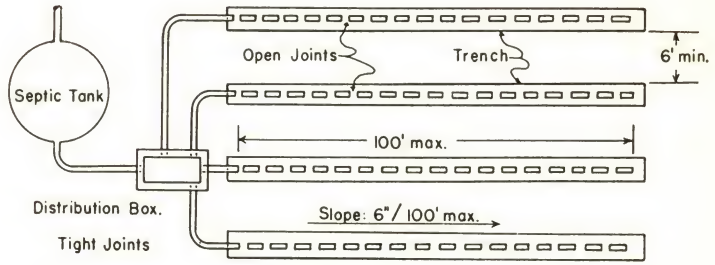
B.5.1 Required. A distribution box shall be provided to receive the effluent from the septic tank and assure equal distribution to each individual line of the disposal field. See Figure 3.

B.5.2 Connection. The distribution box shall be connected to the septic tank by a tight sewer line and be located at the upper end of the disposal field.

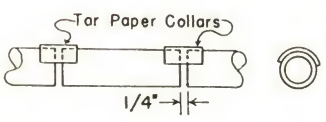
B.5.3 Invert Level. The invert of the inlet pipe shall be located 6 inches above the bottom of the box. The invert of the outlets to each distribution line shall be located 4 inches above the bottom of the box and set at the same elevation.

B.5.4 Inspection. The sides of the box should extend to within a short distance of the ground surface to permit inspection. The box should be kept to the minimum size necessary to accommodate the inlet and outlets.

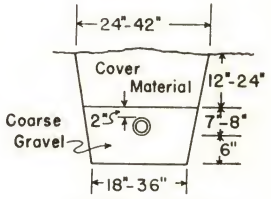
SUBSURFACE DISPOSAL FIELD



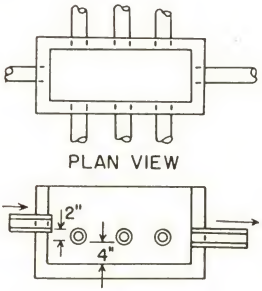
PLAN VIEW



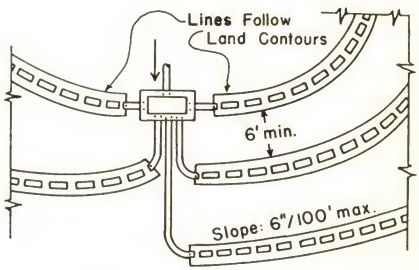
OPEN JOINT DETAIL



CROSS SECTION



DISTRIBUTION BOX



DISPOSAL FIELD LAYOUT FOR SLOPING GROUND

Figure 3.

B.6 ABSORPTION AREAS

B.6.1 **Individual Residences.** The absorption areas for individual residences shall be determined from Table B.6.2.

Table B.6.2 ABSORPTION AREAS FOR INDIVIDUAL RESIDENCES

Time Required for Water to Fall 1 Inch (Minutes)	Effective Absorption Area Required in Bottom of Disposal Trenches (Square Feet per Bedroom)
2 or less	50
3	60
4	70
5	80
10	100
15	130
30	180
60	240
Over 60	(1)

[1] Special design.

NOTE: A minimum of 200 sq. ft. should be provided for each dwelling unit.

B.7 PROCEDURE TO BE FOLLOWED FOR PERCOLATION TEST

B.7.1 Size of Test Holes. Not less than two holes shall be tested, each to be 1 foot square and as deep as the proposed disposal trenches. The holes may be dug with an 8 inch post hole digger if desired.

B.7.2 Variations in Soil Condition. Fill each hole and allow the water to seep away to saturate the soil. Allowance shall be made for variation in soil conditions at the time of the test from year-round average conditions. Where exceptional conditions are encountered, greater depths of water may be used or the test repeated.

B.7.3 Effective Absorption. Add an additional 6" of water to the hole and observe the time in minutes required for the water to seep away completely. Calculate the average time in minutes for the water to fall 1 inch. Average the results from the holes tested. The effective absorption area required shall then be determined from Table B.6.2.

B.7.4 Special Soils. Tests shall not be made on filled or frozen ground. Where fissure-soil formation is encountered, tests shall be made under the direction of the Administrative Authority or the health department having jurisdiction.

B.8 MINIMUM STANDARDS FOR DISPOSAL FIELD CONSTRUCTION

B.8.1 Disposal Field Construction. The minimum standards for disposal field construction shall be as given in Table B.8.2.

Table B.8.2 MINIMUM STANDARDS FOR DISPOSAL FIELD CONSTRUCTION

Disposal-field construction	Minimum Standard
Lines per field, minimum number	2
Individual lines, maximum length	100 ft.
Trench bottom, minimum width	18 in.
Trench bottom, maximum width	36 in.
Field tile, minimum diameter	4 in.
Field-tile lines, maximum slope	6 in. in 100 ft.
Field trenches, minimum separation	6 ft.
Effective absorption area, minimum per dwelling unit	[1]200 sq. ft.

[1] See Table B.6.2.

B.9 DISPOSAL TRENCHES

B.9.1 Disposal Trenches. Disposal trenches shall be designed and constructed on the basis of the required effective percolation area.

B.9.2 Bedding Material. The bedding material shall cover the tile and extend the full width of the trench and shall be not less than 6 inches deep beneath the bottom of the tile. The bedding material may be washed gravel, crushed stone, slag, or clean bank-run gravel ranging in size from ½ to 2½ inches. The bedding material shall be covered by a 2-inch layer of pea gravel or straw to support the backfill as the laying of the tile drain proceeds.

B.9.3 Disposal Field. The size and minimum spacing requirements for disposal fields shall conform to those give in Table B.9.4, and Figure 3.

Table B.9.4 SIZE AND SPACING FOR DISPOSAL FIELDS

Width of Trench at Bottom	Recommended Depth of Trench	Spacing Tile Lines[1]	Effective Absorption Area per Lineal Foot of Trench
Inches	Inches	Feet	Square Feet
18	18 to 30	6.0	1.5
24	18 to 30	6.0	2.0
30	18 to 36	7.6	2.5
36	24 to 36	9.0	3.0

[1] A greater spacing is desirable where available area permits.

B.9.5 Absorption Lines. Absorption lines shall be constructed of farm tile laid with open joints. The tile sections shall be spaced not more than ¼ inch, and the upper half of the joint shall be protected by asphalt-treated paper while the tile is being covered. Perforated clay tile or perforated bituminized-fiber pipe or asbestos cement pipe may be used, provided that sufficient openings are available for distribution of the effluent into the trench area.

B.10 ALTERNATE DESIGN

B.10.1 Alternate Design. In areas having dense soil with a percolation test time greater than 60 minutes which precludes the use of subsurface absorption lines, secondary treatment shall be provided as directed by the Administrative Authority or Public Health Department having jurisdiction.

B.11 PROHIBITED TREATMENT METHODS

B.11.1 Seepage Pits. Seepage pits can function properly only under conditions favorable to the installation of absorption lines, or when certain geological conditions prevail. Owing to the superiority of design and operation of absorption lines under normal conditions and to the possible health hazard created by improperly designed seepage pits, the use of seepage pits for the disposal of septic tank effluent is prohibited.

B.11.1.1 Exception. Seepage pits may be used in areas where such special conditions exist that their use is specifically approved by the Illinois State Department of Public Health.

B.11.2 Cesspools. The use of cesspools is prohibited.

APPENDIX C

TRAILER COACH PLUMBING STANDARDS

C.1 DEFINITIONS

C.1.1 **Trailer Coach or Mobile Home** means any vehicle or similar portable structure used or so constructed as to permit its being used as a conveyance upon the public streets or highways and designed to permit the occupancy thereof as a dwelling place for one or more persons.

C.1.2 **Trailer Coach Park** means an area of land upon which two or more occupied trailer coaches are harbored either free of charge or for revenue purposes, and shall include any building, structure, tent, vehicle, or enclosure used or intended for use as a part of the equipment of such trailer coach park.

C.1.3 **Sewer Connection** is that portion of the drainage piping which extends as a single terminal under the trailer for connecting with the trailer coach park or other sewerage system.

C.1.4 **Water-Service Connection** is that portion of the water-supply piping which extends as a single terminal under the trailer for connection with the trailer coach park or other water-supply system.

C.2 GENERAL

C.2.1 **Plumbing Systems.** Plumbing systems within trailer coaches shall include all water-distribution piping, fittings, and outlets to and including the water service connection and all drainage and vent piping, fittings, and appurtenances thereto, to and including the sewer connection. All such systems including repairs and additions thereto shall conform with the provisions of this Appendix.

C.2.2 **Horizontal Drainage Piping.** Horizontal drainage piping shall be run in practical alignment at a uniform grade.

C.2.3 **Obstruction to Flow.** Any fitting, or connection which has an enlargement, chamber, or recess with a ledge, shoulder or reduction of the pipe area, that offers an obstruction to flow through the drain, or any fitting, trap, or connection that offers abnormal obstruction to flow, is prohibited.

C.2.4 **Supports.** Piping shall be securely supported to keep it in alignment without undue strains, or stresses, and provisions shall be made for expansion and contraction during travel.

C.2.5 **Freezing.** All piping and fixtures which would be subject to freezing temperatures shall be insulated to preclude the possibility of freezing, as directed by the Administrative Authority or other authority having jurisdiction.

C.2.6 **Workmanship** shall be of such character as to accomplish the results sought to be obtained in this Appendix.

C.2.7 **Light and Ventilation.** Water-closet compartments shall be provided with adequate light and ventilation.

C.2.8 **Ratproofing.** All openings through which piping or other conduits pass through floors or walls shall be properly sealed with permanent attached collars of metal or other material that will prevent the passage of rats or other vermin.

C.2.9 **Equipment Condemned.** Plumbing equipment condemned by the proper Administrative Authority because of wear, damage, or defects as a sanitary or safety hazard, shall not be reused.

C.2.10 **Connections to Plumbing System.** All plumbing fixtures, drains, appurtenances, and appliances used to receive or discharge liquid or water-borne wastes shall be properly and individually connected to the trailer-drainage system.

C.2.11 **Sewer Connection.** All trailer coaches shall be connected to a trailer coach park sewer collection system, public sewer, or individual sewage disposal system designed in accordance with Appendix B, if not in a trailer coach park, or if no public sewer is available. Trailers not parked in a trailer coach park shall be provided with a building drain in accordance with Chapter 11, and terminating within ten feet of the trailer sewer connection. All trailer coaches shall be provided with a liquid- and gas-tight connector between the sewer connection and the building drain terminal. The connector shall be a continuous length of Polyethylene Pipe, Series I or heavier, or other similar material of equal quality, not less than three inches nominal diameter. Joints at the sewer connection and building drain terminal shall be made by telescoping the ends of the connector over hubs or nipples extending from the sewer connection and the building drain terminal. The joints shall be secured with

corrosion resistant hose clamps of appropriate size. Approved fittings or adapters may be used if desired. Downspouting or other materials than those specified are specifically prohibited.

C.2.12 Location of Piping or Fixtures. Piping, fixtures or equipment shall be so located as not to interfere with the normal operation of windows, doors, or other exit openings. Operating devices shall be accessible for repair or servicing.

C.3 MATERIALS

C.3.1 Drainage and Vent Systems. Pipe and fittings for the drainage and vent systems shall be as provided in Chapter 3 of the Code and as follows:

(a) Copper tube with sweated joints, Type M
(b) Galvanized steel, galvanized wrought iron, or galvanized ferrous alloy
(c) Lead pipe not less than 1/8 inch wall thickness
(d) Rigid Plastic Pipe in accordance with Section 3.4
(e) Fittings for the drainage system shall be American National Taper Threads, recessed type. Vent fittings may be galvanized, malleable, or cast iron, brass, wrought copper or rigid plastic. If lead is used, all joints shall be wiped. Wiped joints shall have an exposed surface on each side of the joint not less than 3/4 inch and at least as thick as the material being jointed.

C.3.2 Water Piping. Water piping shall be brass, copper, wrought iron, open-hearth iron, steel or copper tubing, Type L, with appropriate approved fittings. All ferrous pipe and fittings shall be galvanized.

C.3.3 Used Materials are prohibited in the construction or installation of the water-supply system.

C.4 FIXTURES

C.4.1 Quality of Fixtures. All plumbing fixtures shall be made of approved materials with smooth, impervious surface.

C.4.2 Trailer-Coach Fixtures. Plumbing fixtures installed in the trailer shall be of materials that will withstand road shock and be so attached to the structure of the trailer as to be resistant to vibration or settling.

C.4.3 **Resistance to Shock.** Resistance to shock shall be determined by tests over a period of actual use of one year or by equivalent simulated laboratory tests.

C.4.4 **Fixture Traps.** Each plumbing fixture shall be provided with a trap containing not less than 2 in. water seal.

C.4.5 **Location of Traps.** Traps shall be so located as to preclude the possibility of trap seal loss during transportation or ordinary use.

C.4.6 **Water Closets for Trailers**

(a) Water closets shall be constructed of such durable materials as to be transported in trailers over the highways without injury or impairing their capacity to operate.

(b) Water closets shall not permit the spillage of trap seal contents during transit and shall perform in a sanitary manner.

(c) It should not be possible to flush a water closet except when trailer is connected at a trailer coach park to a water supply and sewage-disposal system, public or private system.

(d) Each water closet shall be provided with approved backflow preventer or vacuum breaker device to prevent contamination of the potable-water system.

(e) Water closets shall be provided with a water supply adequate to thoroughly cleanse the interior of the water closet when the valve is operated.

C.5 DRAINAGE PIPING

C.5.1 **Installation.** Horizontal piping shall be installed at a uniform slope and in no case less than ⅛ inch per foot slope.

C.5.2 **The Size of Soil and Waste Piping** shall be in accordance with Table C.5.3.

Table C.5.3 (A) SIZE OF MAIN SOIL STACK

Fixture Connections	Minimum Size Through Roof, Inches
More than six fixture units connected to stack	3
Six fixture units or less connected to the stack	2
Lavatory branch waste and trap	1¼
Sink branch waste and trap	1½
Shower branch waste and trap	1½
Bath branch waste and trap	1½
Water closet branch waste four unit type	3
Water closet branch waste two unit type	1½

Table C.5.3 (B) TRAILER FIXTURE UNIT RATINGS

	Fixture Units
Water closet with 3-in. integral traps	4
Water closet with separate traps	3
Water closet—grinder type—with 1½-in. trap	2
Lavatory with less than 1⅛-in. outlet	1
Sink with less than 1⅛-in. outlet	1
Sink with larger outlets	2
Shower with less than 2-in. outlet	2
Shower with more than 2-in. outlet	3
Bathtub with less than 2-in. outlet	2

C.5.4 Sewer Connection. The trailer coach sewer connection shall be provided with a tight cap or plug for closure when not connected to a sewer. The cap or plug shall be permanently affixed to the trailer coach body by means of a keeper chain.

C.5.5 Group Venting. A group of fixtures consisting of one water closet, or shower or bathtub, one lavatory, and a kitchen sink may be installed without individual fixture vents as a stack-vented group. Each fixture branch shall be installed within the limits as given in Table C.5.6.

Table C.5.6 MAXIMUM LENGTH OF UNVENTED BRANCH WASTE

Size of Waste Pipe Inches	Permissible length Feet
3	6
2	5
1½	4½
1¼	4½

C.5.7 Fixture Branches. Fixture-branch connections at the stack shall be made by the use of sanitary tees and the branch drain shall be sloped not more than ¼ inch per foot.

C.5.8 Wet-Vented Fixtures. A single bathroom group of fixtures may be installed with a drain from a back-vented lavatory or kitchen sink as a wet vent for a shower stall or bathtub and for the water closet, provided that:

(a) A wet vent for a shower or bathtub is wet vented through a 1½-inch branch waste when only a lavatory is installed on the branch.

(b) A wet vent for a shower or bathtub is wet vented through a 2-inch branch waste when a lavatory and a sink are installed on the branch.

C.6 VENT TERMINALS

C.6.1 Location of Vent Terminal. Each stack vent shall terminate at least 2 inches above the trailer roof and shall be made watertight by proper flashing.

C.7 INSPECTION, TESTS, AND MAINTENANCE.

All plumbing work installed in trailers shall conform with all the requirements of this Appendix.

C.7.1 Tests

(a) Drainage piping shall be tested and proved tight prior to the installation of the plumbing fixtures under a hydrostatic pressure of not less than 25 psi, and all water piping shall be tested to 100 psi.

(b) When fixtures have been set and connected, the system shall then be subjected to an additional air or chemical test of at least 1 inch of water.

C.8 AIR GAPS

C.8.1 **Each Fixture** shall be provided with an air gap between the lowest opening from any pipe or faucet supplying water to a plumbing fixture and the flood-level rim of such fixture.

C.8.2 **The Minimum Required Air Gap** shall be measured vertically from the end of the faucet or orifice in accordance with the following paragraphs.

C.8.3 **Lavatory** with effective openings not greater than ½ inch in diameter shall be provided with a 1-inch minimum air gap.

C.8.4 **Other Fixtures** with effective openings greater than those indicated in paragraph C.8.3 and when not affected by near vertical surfaces shall not be less than 2 inches; where affected by near vertical surfaces shall be not less than 3 inches.

Water closets may be provided with approved vacuum breakers or backflow preventers in lieu of air gaps.

Vacuum breaker shall be installed on the discharge side of the supply valve and shall be located not less than 6 inches above the flood level of the fixture.

C.8.5 **Vacuum Breakers or Backflow Preventers** shall be made of corrosion-resistant materials of design and proportions which will not deteriorate or deform under reasonable service conditions.

C.8.6 **Vacuum Breakers or Backflow Preventers** shall have been tested and approved to meet test and performance as required for backflow preventers ASA A40.6-1943.

C.9 WATER-SUPPLY SYSTEM

C.9.1 **Service Connection.** Water-piping connection shall be not less than ¾-inch from which ½-inch individual fixture branches shall be run to each plumbing fixture and water heater.

C.9.2 **Emptying of Water-Piping System.** The water-piping system in the trailer for both hot and cold water shall automatically drain out upon disconnecting with the source of supply.

C.9.3 **Separation.** The minimum distance between the sewer connection and the water connection of a trailer shall be five feet.

C.10 TERMINALS

C.10.1 Sewer and Water Connections shall be capped or plugged when the trailer is transported on the highways.

C.11 HOT WATER

C.11.1 Where Hot-water Piping Is Provided, the trailer shall be provided with an approved type automatic water heater of not less than 5-gallon storage capacity.

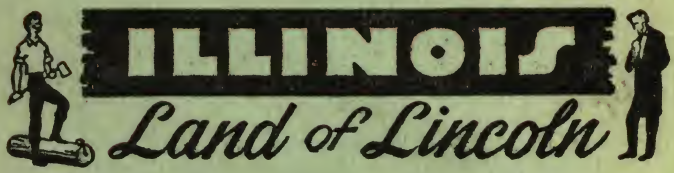
C.12 SAFETY DEVICES

C.12.1 Standards. Each water heater shall be provided with a combination pressure-and-temperature relief valve which has been tested and approved or which meets the specification requirements of the American Gas Association or the National Board of Casualty and Surety Underwriters.

C.12.2 Relief Valves. Relief valves shall be installed not more than 4 inches from the top of the water heater.

C.12.3 Emptying. Each tank shall be provided with a piped and valved outlet so that it can readily be emptied to the exterior of the trailer.

C.12.4 Water-working Pressures for Tanks. Hot water tanks shall be tested for not less than 300 psi hydrostatic test.


ILLINOIS
Land of Lincoln